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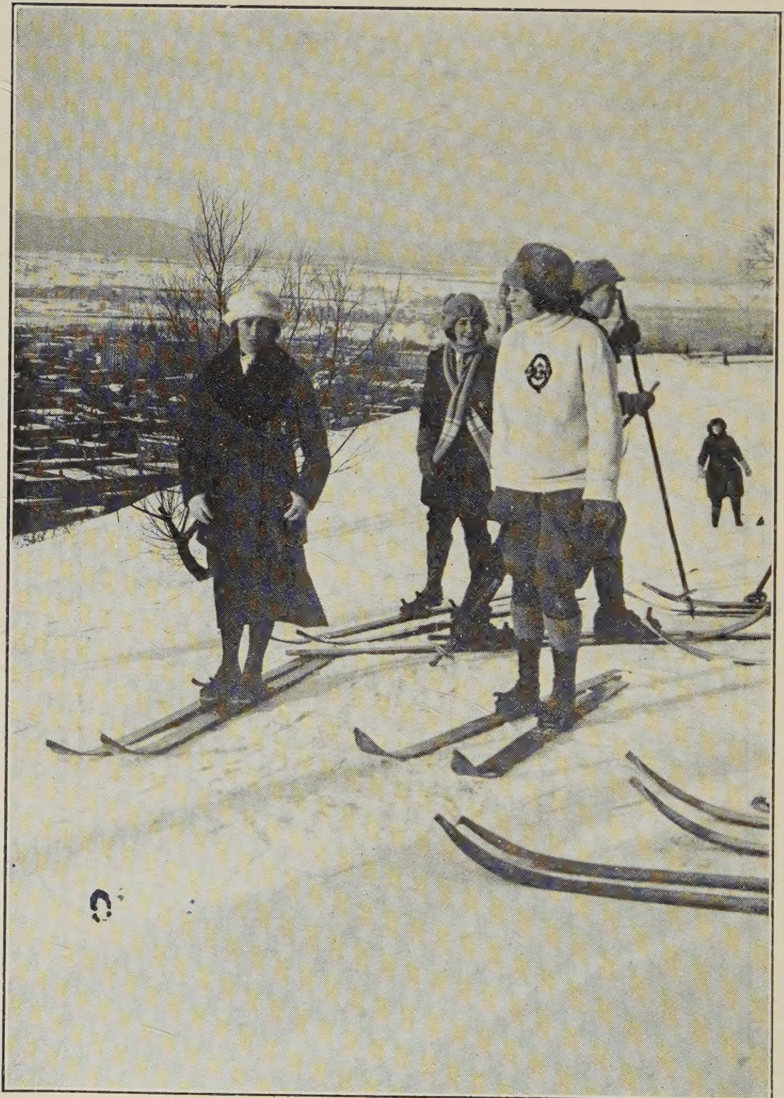

GETTING THE MOST OUT OF WINTER.

SNOW AND ICE SPORTS

A WINTER MANUAL

BY

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Snow and Ice Sports

CHAPTER I

THE IMPORTANCE OF BEING PROPERLY DRESSED

NO fun is better warranted to make you glad you are alive than the fun of snow and ice sports. More and more people are coming to realize this. I myself like golf, tennis and swimming, but I would be willing to sacrifice all three for skiing, skating and coasting.

My present devotion to the winter outdoors was a gradual process. I am frank to admit that my first few winter sports experiences included a considerable amount of physical misery. This part was far from enjoyable. I caught cold, my fingers, toes and ears oftentimes seemed more than half frozen, and my body ranged from dripping perspiration when I was violently exercising, to dangerous chills when I stood still.

I continued with winter sports because the fun counterbalanced the misery. But why not the fun with the misery eliminated? My devotion to winter sports dates from the time when I asked myself that question and then began solving it.

And the solution in great part is as follows—*the right kind and the right amount of clothing.*

It took me quite some time to reach the solution. Old-fashioned ideas and prejudices had to be thrown overboard. One of these was the popular opinion, still too generally prevalent, that a person has to look like a human mattress in order to keep warm out-of-doors in zero weather. I found that, in reality, comparatively few layers of clothing are necessary, provided these are chosen wisely. But I also found that in order to choose wisely it was essential to have a fundamental knowledge of the elements of keeping warm.

Here enter the laws of bodily heat. Heat, it seems, is an active positive condition, a form of wave motion that doesn't like to be confined. It spreads out, tries to get away. Heat likes to get away from your body just as it does from a kitchen stove—unless it is confined.

It presently dawned upon me that clothes didn't keep me warm. They merely helped. Clothes did not produce heat. It was air that did the trick, air comfortably warmed by body heat. The purpose of clothing was to keep this warm air confined, prevent its escape to the freezing outdoors. I found that some clothing did this better than others.

You must keep the body surrounded by dead air spaces for holding the heat thrown off from the

body. The greater the amount of this warm confined air you have between clothing and the body, the warmer you will be. The dead air spaces are both in the meshes of an individual garment and between the layers of garments.

Quite as important as the confinement of warm air is proper ventilation. Almost two quarts of water are evaporated from the body of a normal person during the course of twenty-four hours. Any garment which prevents the free passage of perspiration from the body should be avoided. Likewise, avoid close-fitting clothes and tight belts. The bodily heat should be uniform. Constriction of any kind prevents this. Let there be absolute free play to all the muscles, always perfect freedom of movement.

With these fundamental facts in mind, let us discuss garments and materials. Suppose we first take underclothing. Many people wear cotton underwear the year around. As regards its ordinary city use, from house to office, I have nothing to say. It is a known fact that plenty of people can be comfortable and keep in good health under such conditions.

But so far as winter sports are concerned, when one is tumbling around in the wet snow, perspiring freely from exertion one minute and standing still the next, I must register a vigorous protest. Cotton holds moisture from the body, makes not

the slightest pretence of drying out and presently becomes chilly and clammy. After shivering around a short time in this condition, you have a fine cold on your hands.

Wool is the only suitable fabric for winter sports underclothing. This material performs the two-fold service of holding the warm air and allowing bodily moisture to pass through. Loosely woven wool is better than tightly woven material for there is just so much more room in the material to retain air and allow perspiration to escape.

Two suits of lightweight wool underclothing, one drawn over the other, are warmer than one heavy suit, for you have the added dead air spaces between the two. Separate shirts and drawers are preferable to union suits. The reason for this is that the legs of the drawers get wet from the snow and when separate are easier to change. You can range from one to three suits of underclothing according to the bitterness of the weather. Two suits are a good average.

Unless your feet are properly clothed, you will be very unhappy. Wear plenty of good wool socks or stockings and make sure that these do not bind in any way. Three pairs of socks are none too many for ordinary snow conditions. The outside pair should be larger than your usual size. Socks should preferably be of a loose weave but there are some tender feet which seriously object

to such a weave. It is folly to be uncomfortable, so in such a case one can wear inner socks of finer weave. Remember that these various layers of socks call for extra big moccasins or shoes.

Wear the two inner pairs of socks inside the trowsers and the other pulled up outside. A combination of two pairs of socks and one pair of stockings works well. Women can wear men's socks in this way.

Either a wool over-shirt, such as the best grade army shirt, or a light weight sweater, and heavy wool trowsers, complete what may be termed the foundation of winter sports wearing apparel. It is a good solid foundation, one equally applicable for man, woman and child, and will stand slight pruning or substitution. This foundation, together with boots, cap, gloves, and in some cases a wind-proof outer garment, will be the extent of clothing which the average skier or snowshoer will wear while *exercising* in average winter weather. Women, of course, may choose slightly different garments, but they must keep to the same principle. The woman, if she is wise, will wear trowsers instead of skirts.

In regard to trowsers, let me offer a word of warning against cotton. Khaki trowsers have one advantage in snow sports in that when you fall, the snow does not cling as with wool. But this is more than offset by the fact that water clings in a cold,

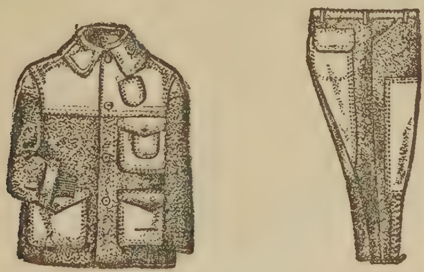
clammy and most uncomfortable manner. Wear a pair of khaki trowsers over the wool trowsers if you wish, for the wool will protect you, but never the khaki alone. Corduroy trowsers as a substitute for wool I have never found very satisfactory. It has been my experience that they get wet and soggy and stay so.

Tightly woven wool trowsers, such as the material from which riding breeches are made, do not tear so easily as the rough wool and the snow does not cling as it does with the rougher material. But after all, what's the harm in a little snow? Heavy mackinaw and pontiac are the wool materials from which most winter sports trowsers are made, and the snow has to be pretty wet to soak through either of these. Mackinaw is soft in texture and pontiac is rough, but both are warm, strong and durable. Forestry cloth is also excellent material. These cloths are great favorites in the lumberjack country.

An additional fortification against wet is found in the mackinaw hunting suit which has patches of khaki sewed over the wool. The coat is reinforced on the shoulders in this manner, and the trowsers are patched in the front and the seat. Both coat and trowsers, as a rule, are cut along the general lines of "stag" garments.

It might be well to add that it was the lumberjack who was responsible for what is today per-

haps the most satisfactory cut of winter sports trowsers. These are commonly known as "stag pants." The old-time lumberjack found his long trowsers a nuisance while rolling logs down the river. The bottoms got wet and dragged, they



A MACKINAW HUNTING SUIT HAVING PATCHES OF KHAKI SEWED OVER THE WOOL.

caught in the sharp caulks in the soles of his boots, flapped and became a bother all around. So the lumberjack got mad, whipped out his knife and cut off the legs of his trowsers just above the boot tops.

The new fashion spread from one logging camp to another and then, in time, clothing manufacturers grabbed the lumberjack's idea. The result is an eminently satisfactory garment for the winter outdoors. In length and cut, these stag pants are somewhat similar to army breeches, although roomier. In some instances, there is a tape at the bottoms and in others, lacings. Of course, the

best grade of wool army breeches make satisfactory winter trowsers, provided they do not bind. Whatever cloth you get, make sure that it is all-wool.

One of the main objects of clothing is to help the body maintain its normal temperature. You wish neither to be too warm nor too cold. The function of the "inner" garments which I have mentioned is to keep the body as nearly as possible at normal temperature when one is exercising. But the moment presently arrives when one needs more clothes. How many more, depends entirely upon conditions. These additional coverings we will call the "outer" garments. And, as with the "inner" garments, a number of layers of fairly lightweight material give more warmth than a single very heavy garment; for you have more confined dead air spaces.

With the possible exception of the outermost garment of all, these should all be wool. Two or three lightweight sweater vests are excellent. The featherweight, sleeveless army sweaters, such as every woman knitted for the soldiers during the war, do very well. The bulky, heavy sweater to which college football teams are so partial cannot be recommended. It makes one look like a small elephant and is not so warm as several lightweight sweaters of about half the total bulk. A more serious disadvantage of the heavy sweater is that

you cannot keep the body at its normal temperature as you can with several light layers which may be taken off or put on, one at a time as conditions warrant.

Personally, I wear only three outer garments even in zero weather and manage to keep delightfully comfortable. These are a lightweight wool vest, a lightweight sweater coat, and then over all as a coat, a stag shirt. The first two of these are

A LIGHTWEIGHT WOOL VEST OF THIS SORT IS AN EXCELLENT "OUTER" GARMENT.

loosely woven material, while the coat is tightly woven. When not wearing any of these I carry them in a small light knapsack on my back. This is no burden whatever.

Ordinary street coats or overcoats in winter sports are unnecessary appendages and nuisances.

Although the heavy mackinaw coat is used to a considerable extent in winter outings, my personal liking in the way of a coat is either mackinaw or forestry cloth cut into the form of a stag shirt.

Just as the old-time lumberjack was responsible for stag pants, so was he the originator of its mate, the stag shirt. The lumberjack seldom wore a coat while working. It prevented free use of his arms and muscles. Instead, he wore a heavy mackinaw shirt. When he got warm, he liked to pull this off and it being something of a bother to poke the tails into the trowsers, he dispensed with this ceremony and let 'em flap outside. But rain had a way of coming along and when the tails got wet, these became heavy and soggy. So the lumberjack whipped out his knife and cut off the tails.

Sporting goods outfitters now make shirts of this sort, none of which deviate very far from the original lumberjack model. Some retain their original name and others are called "cruiser" shirts. Pockets have been added; in some instances with rare abandon (I own a shirt of this sort which has six pockets). Draw-strings are attached to the bottom of one stag shirt, an addition which gives it a blouse effect, while another shirt cut after the same general model is open all the way down the front. In any case, when buying a stag shirt one should get a full size larger than one's ordinary shirt. When worn as a coat, allowance should be

made for clothing underneath. It can be worn either as a coat or as a shirt.

There are times in the blustering winter outdoors when another layer can be put over the stag shirt. Against ordinary, negative cold, wool is protection enough. But wool is permeable and a penetrating north wind that blows hard and sharp enough cools off the warm air confined within. What is needed in such instances is a wind-break with which to protect the warm air, or in other words, a garment which cannot be penetrated by the wind.

An air-tight layer inserted among those of loosely woven wool would be wholly out of place for it would ruin the ventilation and warm air space service which the wool performs. But an air-tight material as the outermost garment in no way interferes with these proceedings and, as a wind-break, it performs a valuable service. It may even be moisture-absorbing cotton without doing any harm.

A good wind-break holds the warm air in and keeps the cold out. The most commonly used garment of this sort is the leather jacket. Of the heavy sheepskin lined coats of this variety I do not think highly, for if you have the proper number of wool garments underneath, the added warmth from the lining is too much under average conditions. The unlined jackets, to my way of

thinking, are preferable. They are light in weight and wind proof. Get one which is long enough to cover the abdomen. Some are far too short.

Canvas is practically wind proof and a canvas hunting coat may sometimes answer. But in my

A GOOD WIND-BREAK; THE UNLINED LEATHER JACKET.

opinion, the best wind proof outer garment of all is the Alaska parka.

Perhaps in Alaskan stories or in articles by Arctic explorers you have read about the parka. The idea comes from the Eskimo but, like the stag pants and shirt, was too good to remain hidden in the woods. The garment used by the Eskimo is made from reindeer skin, but its white-man adaptation is variously fashioned from duck, light-weight khaki, bed ticking and almost any other fairly wind proof material that happens to be handy. The parka is a loose, roomy, hooded shirt which reaches nearly to the knees. There is no

opening either in front or back. The hole at the neck is only large enough to poke one's head through. It is drawn over the head much after the manner of a nightgown and looks not unlike one.

Wool parkas were used by our aviators during the war and this garment is now sold in some of the army goods stores. But as I have said, wool is permeable and hence not the best material for the purpose. The construction of the government parkas is fine, but khaki would be a more suitable material.

If you are handy with needle, thread and shears, you can make a good parka yourself. An ordinary shirt may be taken as the general working model but it must be considerably larger, broader and somewhat longer than this garment. The parka must be like a roomy overcoat. The front and back are solid pieces, and to the neck piece is sewed a hood which comes down well over the forehead. Around the wrist and face openings can be placed elastic bands to prevent snow from working in. The Eskimos use fringes of fur for this purpose.

There is no need for chilly fingers in the winter outdoors if the principles of body and foot warmth are extended to the hands. Give the fingers plenty of room for the warm air spaces; wear two layers of wool. This is a better arrangement than a lined

glove. I have found that a wool glove next to the skin and over this a wool mitten, then over all an air-tight buckskin mitten, serve as an excellent combination.

The ideal headgear, provided one did not have to breathe and see where one was going, would, in my opinion, be a loose-fitting, warm wool sack drawn over the head and drooping down on to the shoulders. And one of the best winter caps is modeled very much on this principle although wisely enough a slit is left to accommodate eyes, nose and mouth. The forehead, neck, ears and chin are completely covered. This helmet I have found a more comfortable piece of headgear than the picturesque old time stocking cap or "toque," although the toque is by no means unsuitable.

Such complete protection as I have mentioned in connection with the loose helmet is endurable only in very cold weather. In mild weather the helmet can be rolled into a skull cap so that all but the top of the head is exposed.

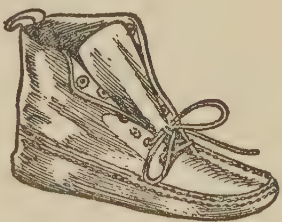
Last, but far from being least, the footgear must be right. My personal liking as regards average snow wear is for a soft-soled, pliable moccasin reaching nearly halfway up the calf of the leg. When snowshoes are worn, a soft-soled boot of this sort is essential; the webbing of a snowshoe is ruined through impact with a sharp high heel. On the ski, however, a boot having a heel is neces-

THE LOOSE-FITTING HELMET DRAWN DOWN ON A COLD DAY AND ROLLED UP IN MILD WEATHER.

THE OLD-FASHIONED STOCKING CAP.

THE RUBBER-SOLED AND RUBBER VAMP BOOT.

THE HARD-SOLED MOCCASIN BOOT.



THE SOFT-SOLED PLIABLE MOCCASIN.

sary. It is wise to get a pair of boots which are made especially for skiing and then reserve these exclusively for this sport. The subject of skiing boots is taken up more fully in Chapter II.

Sturdy hunting boots, the heavy service model of army shoe, and the type of moccasin which has a heavy sole and a heel, are all suitable varieties of winter footgear, although none of these can be worn on snowshoes for reasons mentioned. A possible exception is the hunting boot, which has a rubber sole and rubber vamp. Personally, I have no great liking for rubber on the feet but there are plenty of people who think highly of this type of footgear.

Whatever your footgear may be, make sure that it is roomy enough to accommodate three pairs of socks without binding the feet. Keep your boots oiled, although not soaked in oil. It will make them last longer, feel easy and keep your feet dry.

CHAPTER II

SELECTING SKIS AND SKIING EQUIPMENT

ENJOYMENT and success in almost any sport are largely dependent upon having the right kind of equipment. Of all sports there is none in which greater care must be given to the selection of equipment than skiing. In more than one instance a broken leg has resulted from an imperfect ski, a badly twisted ankle from an unsuitable ski harness.

Proper foresight in selecting the right sort of skiing equipment will save one from trouble and discomfort. There have been boots which fitted neither skis nor harness, boots which chafed and raised painful blisters on the feet. Again, the ski harness has been at fault, a situation warranted to make one's feet and life quite miserable. Or, perhaps the skis themselves have been the main offenders; sufficient care has not been given to such matters as the variety of wood, the grain, the possibility of splitting, and the proper length of the ski.

I well recall a skiing vacation which a friend and I took two winters ago. We traveled a good many miles by railroad for this vacation, alighted

joyously from the train at the edge of the white-blanketed countryside, strapped on our skis and struck across the white waste.

It so happened that the pair of skis which my friend wore were cheap, cross-grained pine. While coasting at high speed down a long, fast hill he suddenly performed a none too graceful somersault and then upon picking himself up found that his right ski had split completely in two, directly behind his boot. The break was so complete that there was no way of mending it although ordinarily a broken ski can be patched. And there was not another pair of skis to be had within a radius of fifty miles.

There are good skis and there are poor skis. Those of my friend were poor and, although he had fully appreciated this fact, these had stood him in good stead before and he was willing to take another chance. They came to grief, as most poor skis eventually do, and my friend suffered the consequences.

Even the best skis, of course, are not infallible when subject to unusual strain. For ordinary ski running however, well-made skis are so nearly infallible that you can venture on them across the white blanket of winter with almost certain assurance that they will bring you back to the starting point. This assurance is well worth having and it is possible only with skis of the best quality. One

of the most short-sighted examples of economy of which I know is that of buying cheap skis.

My reason for laying stress upon this point is that there are many poor varieties which are sold to the unwary. Some time ago I came across a display of such skis in a department store. There was hardly a pair there suitable for anything but firewood. In all fairness, however, I am bound to add that this particular display was exceptional. There are a number of manufacturers in this country who are making excellent skis and, in addition to these, quite a few fine Norwegian and Swedish skis are being imported.

There is no lack of good skis. It all comes down to a matter of wise selection and this is by no means a difficult proceeding. Unfortunately, to the skiing beginner, all skis look pretty much alike. But if he walks into a sporting goods store with certain fundamental pointers upon the subject, there is no reason why he should not walk out with a thoroughly dependable pair. I will try to give a few of these pointers.

Of first importance comes the wood—its variety and grain. Pine, spruce, birch, maple, magnolia, ash and hickory are various woods from which skis are made. Provided the grain is above reproach, the wood is properly seasoned, and there are no bad knots, it is possible to make a serviceable pair of skis from any of these. At the same time,

experience has proved that the most universally satisfactory of these various woods are ash and hickory. Ash or hickory skis will cost you twice as much as some others, but they are easily worth the difference.

Granted that ash and hickory are the best woods for skis, the question arises as to whether one of these is preferable to the other. This is not altogether easy to answer. Some skiers prefer one, some the other.

Hickory is the heavier wood of the two and for this reason is quite a favorite with ski jumpers, as the weight tends to help balance in jumping. Furthermore, hickory has a tendency to wear longer and is not so likely to develop splinters as is ash. But for all-around, average skiing, ash is unquestionably the favorite wood. A pair of well seasoned ash skis is a happy combination of strength, flexibility and reasonable lightness in weight that is a joy to have underfoot. In choosing either hickory or ash, one is sure of a suitable variety of wood. Nor is a good pair of maple skis to be despised.

Irrespective of the variety of wood you choose, beware of cross-grain. With a cross-grained ski there is always the possibility of splitting or slivering. Examine the wood closely to make sure that the grain is wide and runs nicely parallel to the length of the ski.

In some skis, excellent in other respects, it will be found that the grain, while reasonably parallel to the length, has a tendency to run outward toward the front end of the ski. Such a piece of wood should be avoided. Bear in mind that a ski continually moves forward and that after constant friction with the snow, any grain outcroppings are likely to become sharp, mean splinters. Where the tendency toward grain outcroppings is toward the rear end of the ski the fault is not so serious, for in this case there is not the same amount of friction with the snow. Beware also of bad knots and make sure that the wood is not warped.

The presence of a long groove on the bottom of the ski and running nearly its full length is a distinct help in keeping one steady while skiing. This serves as a purchase upon the snow and prevents much aimless slipping. Most skis are made with this groove but there are some which are not. Ordinarily, the groove runs down the direct center of the bottom of the ski. Some skis are made with two grooves and those used for jumping sometimes even have three grooves. For all ordinary purposes, either one or two grooves are quite enough.

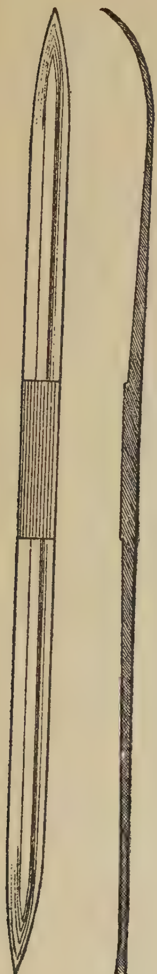
We now come to ski models. In view of the fact that there are only two models in general use it may be ventured that this is a fairly simple problem to solve. Of these two, the choice rests

largely on the particular type of skiing and the country in which the skis are to be worn.

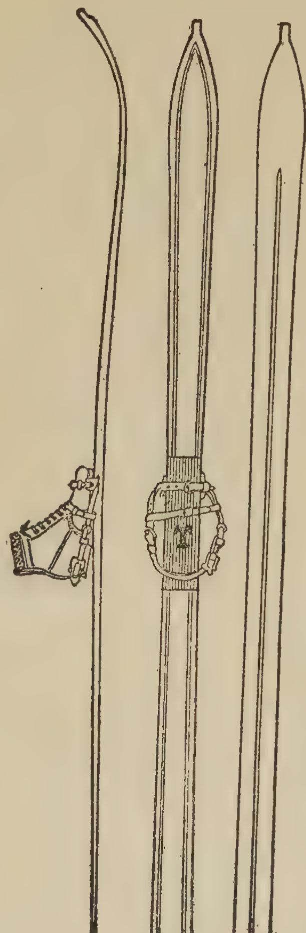
The "cross country" and "straight side" are names by which one of these models is variously known. This type of ski, with the exception of the extreme front and rear ends, is the same width throughout its length. It is a ski which is built for straight ahead racing and for making speed over a flat country, such as the prairies. This ski is wholly impractical for a hilly country, because of its inability to make turns. But in a flat, level country, where there are great distances to be covered, it proves a most suitable type.

The remaining model is far more generally used than the "straight side." This is known as the "telemark." The name comes from the Telemarken peasants of Norway who originated this model centuries ago and have been using it ever since.

Although the exact measurements of the "telemark" vary, its outlines are always the same. The "telemark" differs from the "straight side" in construction in that the width is a variable quantity throughout its entire length. The forward part, from the position of the boot to the upturned tip is somewhat the shape of an elongated spoon. The width at the front end just below the tip in a well constructed "telemark" is between three and one-half and four inches. This tapers down gradually



TOP AND EDGE VIEW OF A "STRAIGHT SIDE" TYPE OF SKI.



EDGE, TOP AND BOTTOM VIEWS OF A "TELEMARK" MODEL OF SKI.

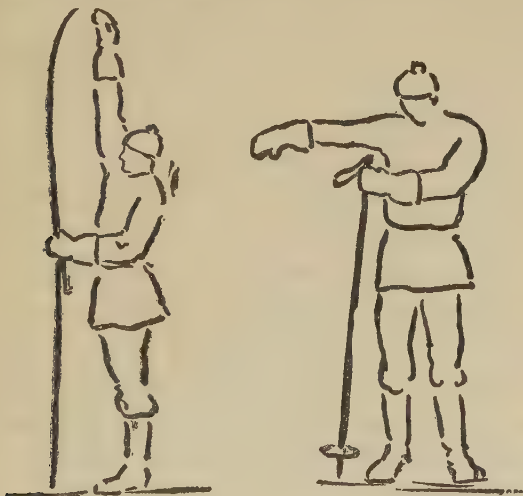
so that at the position of the skier's boot, the ski is about an inch narrower than at the front. From the foot position, however, the ski tapers outward and at the extreme rear end becomes nearly as wide as the forward end.

It seems strange that so simple a matter as this slightly varying width should make a world of difference in the usefulness of a ski; but this it does. Whereas with the even-width, "straight side" model a quick turn during a coast down hill becomes an extremely difficult matter, the same turn with the "telemark" can be negotiated with ease. The "telemark" is the more all-around model and as a rule the far more satisfactory in the sort of country where skis are most used.

It is not surprising that so many beginners should pick out skis which are too short for them. Before you have become accustomed to these long, rangy snow-boats they surely do look unwieldly and unmanageable. Yet, in reality, a fairly long pair of skis is easier to manage than a very short pair. There is, however, a correct length for every one and what this may be depends upon your height and reach.

The usual rule for picking out the right length is to stand a ski on end and then reach your arm up over your head. If the finger tips touch the tip of the ski, the length is correct. I might add

in this connection that the correct length of a ski pole is gauged by holding the arm out straight, at right angles to the body. If the pole is just



HOW TO SELECT SKIS AND SKI POLES OF THE PROPER LENGTH.

long enough to pass comfortably under your arm, it is the right length.

Skis are made in various lengths ranging from 5 to 9 feet. These measurements, as a rule, skip from 5 to 5½, from 5½ to 6 feet, and so on. Let us suppose that one's reach is half way between 6½ and 7 feet. It does not make any vital difference which of these lengths is chosen. If one expects to go in for downhill skiing turns to a considerable extent, the shorter length is perhaps

the more suitable, but for straight ahead running and coasting, the longer of the two might be better. With the "straight side" model, there is no disadvantage in wearing a ski which is considerably longer than your reach. The main drawback to a "telemark" which is longer than your reach lies in the fact that the making of a turn becomes difficult.

So much for the proper wood, grain, model and length in the selection of a pair of skis. Fully as important in some respects is the harness which holds one's feet to the skis. Although there are only two types of skis, there are fully a dozen different kinds of harnesses. In some instances, the harness is already attached to the ski, but more often each is sold separately and you have your choice of a number of foot-binding devices. Although I will take up the question of boots more fully further on, I might suggest at this point that it is wise to buy skis, harness and boots which are entirely compatible with each other.

Some ski harnesses are rigid, while others are flexible, some are easy to put on and take off and others are troublesome. The best harness is one which is a happy combination of rigidity and flexibility and one which can be readily unfastened or fastened. I was once witness to a happening which may be worthy of mention in this connection. At least, it proved that a harness which can

be unbuckled instantly is not without its good points.

I was one of a party of outdoors men exploring on skis the White Mountains in winter. While following the Pemigawasset River we came to the edge of a black, wide, deep water hole. Suddenly, one of the men slipped and fell into this icy water, skis and all, sank for the moment completely out of sight. He had the presence of mind immediately to reach back and disengage his skis. Fortunately, the ski harness attached to his feet was a type which could be unbuckled instantly. But for this fact, matters might have gone badly with him. With skis out of the way and floating down stream, he swam safely to shore.

This incident was unusual, to be sure, and a chilly bath of the sort is unlikely to come the way of the average skier. But there are plenty of times on ordinary snow-covered slopes when almost any skier feels thankful for a harness which has a certain amount of flexibility and from which his foot can be disengaged in a jiffy. This flexibility should be sufficient to allow your foot to bend at the toes so that the knee can touch the front part of the ski without discomfort to the toes in the process. In a general way, it may be said that there should be a generous amount of up and down play to a binding and but a slight amount of sidewise play.

A few winters ago while coasting down a slope one day I whizzed over a sudden drop which I had not seen. Below was level ground and in landing upon this I was thrown violently forward. When I picked myself up I found that one of my big toes was very much out of kilter. For the remainder of the winter it gave me discomfort whenever I walked or skied.

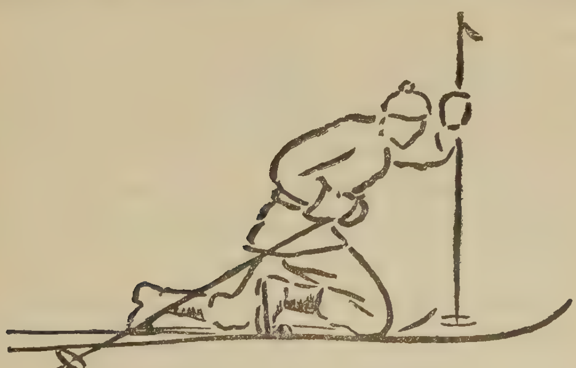
I cite this example as indicative of the ease with which toes may be broken unless one wears a harness having a generous amount of up and down play. The harness which I wore at that time was altogether too rigid in this respect. Had there been enough play to it so that in falling forward my knee had come into contact with the ski, I should have suffered no discomfort. As it was, the complete shock of falling forward became centered in the toes.

For which reason, when one is having a harness fitted to the boots it is wise to try the kneeling test. This consists merely of making sure that the knee will readily touch the front part of the ski in any forward plunge.

Another element to consider is the fact that all feet are not built alike. The toes of some people are stiff while those of others are supple. And if you find that the particular kind of harness which you are wearing does not offer the proper combination of rigidity and flexibility for your partic-

ular feet, the wisest plan is to take it off and hunt up another kind.

Practically all ski harnesses now manufactured in this country are copied from European models. Even American ingenuity has been at a loss to bring out any startlingly new ideas. As a matter



THE KNEELING TEST.

of fact, there are only a few dependable models and from these I will select for description the one which I have found the most satisfactory and which is more generally used than any other in this country.

In Europe, where this particular harness was invented, it is known as the Huitfeldt with the Ellefsen patent buckle. In our own country, it is manufactured by a half dozen different firms and sold under as many respective names. In one or two instances, slight variations in construction

have been added to the original European ideas, one of these being the addition of teeth-like adjustable toe clamps, but in all essentials the model remains the same. It is a difficult harness to improve upon.

With this Huitfeldt harness, the toe of the boot is held in place by a metal clamp on either edge of the ski. A short connecting strap between these clamps runs across the cap of the boot. A longer strap reinforced with rawhide encircles the heel. The ends of this are permanently anchored at the respective toe clamps. Near the rear of this strap at a point where it fits around the heel is a metal snap-lever buckle.

With a quick flick of the fingers, this buckle can be instantly closed or opened. And it is by these respective proceedings that the boot is attached or released from the ski. It is an arrangement which is snug and secure enough to hold the foot firmly in place on the ski as long as you wish it there and at the same time you can toss your skis free with a mere kick if the need arises.

We now come to another highly important item of skiing equipment—the boots. The boots must fit the wearer, the harness, and the skis. Unless these three work in perfect unison, one is subject to almost constant discomfort and annoyance. Especially with the Huitfeldt and other types of harnesses which depend mainly upon a heel strap

for their security is the right kind of boot necessary. In these instances, the heel of the boot must be concave around the edge so that the heel strap finds a firm purchase in this groove. Otherwise, the strap will slip off constantly and become a source of continual bother. Harnesses in which the heel strap is not made use of do not need a boot having a concave heel.

The ordinary soft, flat-bottomed moccasin worn so effectively on snowshoes is wholly unsuitable for skiing. But if a concave heel and thick wide sole is attached to the bottom of this moccasin, it may become a very fair skiing boot. This type of skiing boot is commonly used. The ideal skiing boot may be either of this type or it may be built somewhat along the lines of a mud scow and (judged by ordinary shoe standards) almost as ugly. It is usually a thick-soled, square-toed brogan with sides which have a tendency to run parallel. The soles should be appreciably wider than the uppers so that the foot does not come into contact with the metal clamps into which the toe of the boot fits. Much foot misery may result from the rubbing together of the toe clamps of the skis and the uppers of the boots.

Even with fairly wide soles there is, of course, an appreciable amount of friction between the edges of these and the metal toe clamps; which means a considerable amount of wear and tear to

the soles. This wear can be minimized by attaching small metal guards to the edges of the soles at the four points of contact.

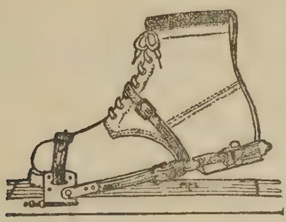
Another method of reaching the same result is that of lining the four toe irons with leather. My friend Dwight Franklin, writing in *Country Life,* describes as follows a simple way of accomplishing this:

"Use a piece of sole leather about three-eighths of an inch thick, and cut it to fit the iron—a slot corresponding to the one in the iron should be made in the leather. It is well to have the rough side inside. Drive split rivets through the four holes in the irons, clinching them in the leather, using rather short rivets which sink into the leather when clinched. These split rivets are better than copper washer ones because the latter may chafe the sole almost as much as would the bare irons."

Ordinary outdoor boots are often times used in skiing but as a rule with poor success. They are not cut right for the purpose. Although I have always been a firm advocate of the regulation army boot for hiking and other outdoor activities, I have found it a failure on the ski. The reason for this is that the curve of the outer edge of the sole does not make it possible for the forward part of the boot to remain firmly set in the toe clamps. The foot is continually thrown off to one side of the ski. This results in running the points of the skis to-

gether, general loss of control and an annoying mix-up all around.

The construction of the regulation skiing boot is such that there is plenty of up and down but no



A SERVICEABLE HARNESS AND BOOT.

A BOOT PROTECTOR.

WHY THE ARMY BOOT IS UNSUITABLE; SIDES ARE NOT SUFFICIENTLY PARALLEL.

lateral movement. The best pair of skiing boots I ever owned were not made for this purpose at all but they answer perfectly. These are a pair of old issue Militia square-toed brogans which I picked up in an Eden Museé sort of store in New

York which specializes in old-time army goods. The construction of this boot is entirely different from that of the present-day army shoe. The sole is almost a rectangle in shape. This pair of boots cost me exactly one dollar and ninety-five cents. Unfortunately, there was but one more pair of these brogans in the store and I doubt if there are any others still in existence.

It is important that the skiing boots be roomy. They must not bind or restrict the circulation in any way. Make allowance for three pairs of socks, for the time will come in skiing when these will be needed. Ski boots should be from one to two full sizes larger than your ordinary street shoes. An inner sole can always be added when not so many socks are worn. The boots should be kept well oiled.

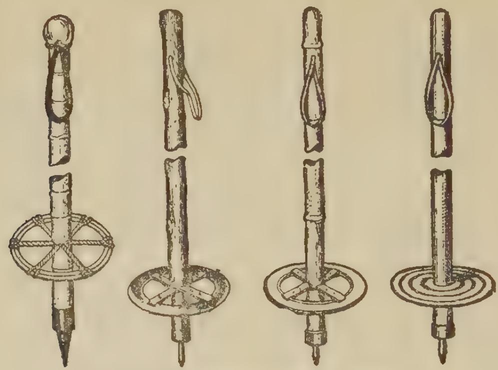
Ski wax, ski poles, a good knife, emergency buckskin thongs, a ruck sack for carrying lunch and peeled off clothing when exerting oneself—these items fairly well complete the list of skiing equipment for all ordinary purposes. In regard to a knife, I may say that there is none better than the Boy Scout's knife. This useful article is something of a small tool chest in itself and contains an awl and screw-driver, which are invaluable in connection with skis.

Ski poles cannot be recommended without certain qualifications. Although these add greatly to

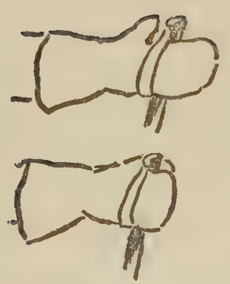
the speed and enjoyment of the sport, it may be said that the beginner would do wisely to postpone their use until he has begun to feel pretty well at home on skis without the help of poles. He is likely to regard them as crutches. In addition to this element of dependency, ski poles sometimes become dangerous weapons in the hands of a panicky beginner. There have been instances where people have fallen upon the sharp metal points and seriously injured themselves.

There are other ways in which ski poles may become dangerous. When coasting down a wooded slope it is just as well to keep the hands free of the straps attached to the poles, for sometimes a pole catches in some obstruction and gives your arm a mean jerk. At all times, hold the poles in such a manner that the hands can be immediately released if necessary. Never, when coasting, hold the poles across the body or pointed in front; allow them to trail behind. And never by any chance make a ski jump with poles in your hands.

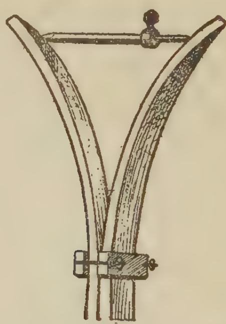
After a skiing beginner has had his first taste of sticky, pasty snow, such as is frequently experienced on warm winter days, he realizes perhaps that a small but important item of skiing equipment is a stick of ski wax. Some of this material rubbed on the bottoms of the skis works wonders so far as ease of progress is concerned. The wax sticks best when the skis are dry and for this



VARIOUS TYPES OF SKI POLES.



HOW TO HOLD A SKI POLE.



KEEPING SKIS SPRINGY AND IN SHAPE.

VARIOUS METHODS OF PATCHING A BROKEN SKI.

reason, when getting ready to venture forth on wet snow, it is wise to wax the skis before leaving the house. But even when skiing, a small stick of wax in one's pocket is usually a valuable adjunct to the sport.

A ski which breaks can ordinarily be mended or at least patched up sufficiently to carry one home, in case one is away on a long trip. When skiing long distances, a few mending materials should be included in one's equipment. One method of patching a break consists of overlapping one broken section with the other, boring two holes and clamping the two parts together with bolts and nuts. Another method is that of laying a small steel plate across the break, screwing it to the ski on either side of the break and then fortifying this purchase with two more small plates, one on either edge of the ski.

The well-made ski has a considerable amount of natural springiness. The reason for this largely is the slightly upward bend of the bottom of the ski. The bottom does not rest flat upon the snow. This natural springiness should by all means be retained for it is a great help in skiing. It will perceptibly vanish, however, unless the skis receive the proper attention when they are not in use, especially so in the summer.

When skis are not in use they should be placed bottom to bottom and strapped together both at the

rear end and at the point forward where the upward curve begins. Then, a few inches to the rear of the bindings there should be inserted between the skis a small wood block, about two inches thick. This prevents them from warping or becoming flat. In addition to this arrangement a spreader between the two tips is a help in retaining the natural shape and springiness of a pair of skis.

These and a number of similar points mentioned in this chapter are illustrated by drawings, some from Alexander Taylor and others by Dwight Franklin. Most of the drawings in the succeeding chapters are by Dwight Franklin.

CHAPTER III

THE KNACK OF SKIING

GETTING started right and then following along with conscientious practice makes one a reasonably proficient skier in a shorter time than you would believe.

A few winters ago a friend and I visited Norway, and one of the first sights we saw in the snow-smothered streets of Christiania was a three-year-old mite, a youngster, toddling merrily along on a pair of skis. In days which followed we encountered numerous other skiers of the same tender age, and more than a few grandfathers and grandmothers well past the seventy mark gliding and coasting happily across the snow. For in Norway everybody skis, every member of the Norwegian household. There is no age limit.

My friend told me that he had never been on a pair of skis, and then loathfully admitted that the truth of the matter was that he had never quite had the courage to try the sport. The long, ungainly snow-boats looked so uncontrollable that he thought it best to leave them to the experts. The streets of Christiania, however, changed his attitude. He caught the infection of skiing, and re-

marked that if a three-year-old youngster could handle a pair of skis he guessed he could; and, after the usual amount of awkwardness which is the share of the beginner, he did. Before leaving Norway he became a confirmed skiing "fan," and has remained so ever since. He lives in New York, and the only thing he has against this city is that there is not snow enough. When the white flakes are late in coming, he gets restless, hauls out his skis, and takes a train to the Adirondacks or White Mountains.

Although this single incident may not prove anything in particular, I hold that it is fairly significant of three well-established facts: First, that many people who have never tried skiing think they can't do it. Second, when they try it, they find they can. Third, when they find they can, they become lifelong enthusiasts.

The universal popularity of skiing in Norway is due partly to tradition and partly to the fact that it is very good fun. Skiing originated in Norway more centuries ago than anybody knows anything about, and it is the national sport of the country. In the United States it has won its way to general popularity wherever snow flies, solely through its merits as a sport, and all this within the past few years. Before that time a ski was a museum curiosity in this country. To-day, in New Hampshire, Michigan, and Minnesota the

ski is seen almost as frequently as our own traditional sleigh. And more than once in New England I have seen five- and six-year-old youngsters gliding along on skis just as though they were in Norway.

Skiing, of course, like other sports, is a game of skill, and, by the same token, its adherents are of varied grades of proficiency. In any sport one need not be a champion in order to have a whopping good time. In golf, for example, there is a vast army of golfers that cannot go around a course in less than 115, but even this score means a reasonable amount of proficiency and gives keen enjoyment. It is a good deal the same way with skiing. The best of skiing is the straight running, coasting, and a few simple turns, and it is within the power of anybody to learn these.

Some skiers do not get along very well even when they have been at the game for some time. The reason, as a rule, is that they have started wrong. Just as the golf beginner is fascinated by the full swing and wants to try that before mastering the fundamentals of the game, so is the skiing beginner thrilled by the thought of a speedy coast down a steep hill. Coasting on skis is mighty good fun and not at all difficult after one has begun to feel somewhat at home on the fleet wooden wings, but it is several stages along in the game.

Skiing and golf are comparable in a number of ways in this respect. In each case there is a gradual building-up process. Each new movement during one's advancement is directly connected with some fundamental that has previously been learned. Which is the reason why it is wise for the skiing beginner to resist the temptation of a thrilling coast downhill (which he is certain to take with atrocious form) and, instead, stick for the time being to the less imaginative level ground. Let him first learn how to stand on skis without toppling over, feel at ease on the long snow-boats, learn how to balance himself, get into the habit of keeping the skis close together instead of sprawled apart. In short, let him first acquire the correct skiing glide. In doing so he can to advantage forego the help of ski poles. The beginner will eventually become a better skier if he goes through the first stages without their help.

In skiing, as in most other sports, the right way is the easy and simple way. In the game of golf the unconscious, easy, natural swing of the caddy boy is the despair of more than one perspiring, hard-working golfer. So, in skiing, the tendency of most beginners is toward work instead of ease. Skiing is essentially a game of skill, not muscle. The average skiing beginner seems to think that he has a pair of snowshoes attached to his feet. At any rate, one of the first movements he is likely to

make preparatory to pushing the ski forward is that of lifting it completely off the ground. Upon which one is prompted to ask, why this unnecessary labor? Surely, it is much easier to push the ski ahead without raising it. During the skiing glide the ski should never leave the snow.

The beginner presently sees the wisdom of this and lifts his skis no more. But the motion through which his legs and skis are going is not the skiing glide. It is more of a stiff-legged shuffle. Perhaps his skis, properly enough, are close together and maybe falls are becoming less frequent, but with the stiff-legged shuffle he is making slow progress; in fact, barely more than crawling along.

Perhaps quite by accident during this motion he happens to bend his forward knee and lunge his weight forward on the advanced ski. Something happens which has not occurred before. This ski glides ahead, seemingly without any added effort on his part. And thereby he has discovered the correct skiing glide.

The discovery of the skiing glide is a big find. It is the foundation of skiing. For the first time, one really begins to feel at home on skis. And all there is to it is lunging forward on one foot, keeping the weight forward and then advancing the other foot in the same manner before the first ski stops traveling. In this way, a continuous motion is kept up. There is no "pushing off" with a ski,

THE SKIING GLIDE ON LEVEL GROUND.

HILL COASTING.

for to push off implies that a ski is not in motion. During this glide the skis should be very close together. There is no harm in having them in actual contact with each other.

With the nicety of balance and general sense of control which come from diligent practice of the skiing glide one can tackle hill coasting with reasonable assurance that he will make an uninterrupted, through trip from the top of the slope to the bottom. For coasting is essentially a matter of balance. The skis should be kept close together, the point of one advanced about a foot beyond that of the other. The body should be inclined forward, so that it is at right angles to the slope. The knees may be slightly bent, but not the body. One sways the body forward or backward as the contour of the slope dictates.

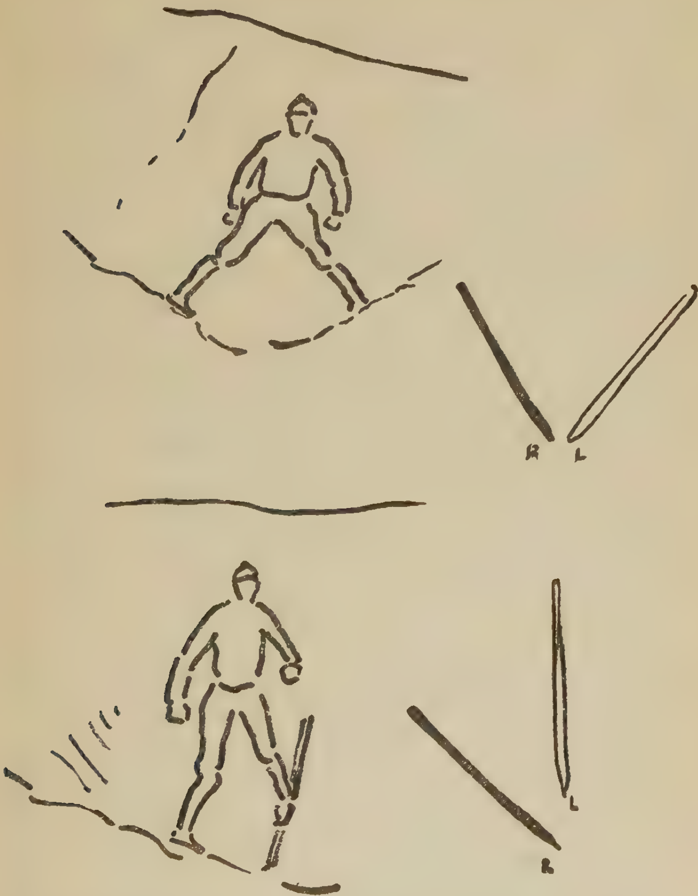
During the course of this coast, the greater part of the body weight is upon the rear foot. Muscles should be relaxed instead of tense. If the skis begin to run apart, as sometimes happens, do not use main force in attempting to bring them together again; merely by shifting all your weight to one ski, the other can readily be brought beside it.

An open, unobstructed slope can be easily negotiated. But it is a long hill that has no turning, and presently you will encounter obstacles, such as a tree or rock, which necessitate either an abrupt halt in your merry coast or a quick swerve to one

side. Herein enter the elements of braking and steering, further stages in the education of the skier.

The most simple and obvious way of slowing down or coming to an abrupt stop when part way downhill is that of straddling the ski pole. Although this tactic may sometimes be used in an emergency, it is darkly frowned upon by all well-brought-up skiers, mainly because the skill of skiing plays no part in its operation. All sports have their unwritten laws, and some of these can be broken on occasion without any harm being done. One of the unwritten laws of skiing is that a man shall use other means of braking than that of straddling his ski pole. But this law is occasionally broken.

When coasting straight down a slope, the best braking method is one known as the "snow-plow." This name fairly well indicates the operation. The points of the skis are brought together and the rear ends are pressed outward so that the skis form a letter V. At the same time, the outside edge of each ski is slightly raised so that it forms something of a wall against the snow similar to that of the bow of a snow-plow. The wider apart the rear ends of the skis are and the more perpendicular the wall, the more abrupt will the stop be. A ski pole dragged directly behind adds to the braking effect. Throughout the proceeding the body should lean



ABOVE: THE "SNOW-PLOW" AND POSITION OF THE SKIS.
BELOW: "STEMMING" OR "HALF SNOW-PLOW."

forward, and there should be an equal amount of weight on each ski.

When coasting downhill in a diagonal course, the favorite braking method is "stemming." This is sometimes known as the "half snow-plow." Here again the name happily indicates the operation. This differs from the full "snow-plow" in that only the ski on the downhill side is pressed outward. The other ski glides straight ahead in its usual course. The speed is regulated by the amount of snow-plowing which the stemming ski performs. As before, the wider the angle and the straighter the wall of the stemming ski, the slower the speed. Likewise, by throwing weight upon the upper ski, your speed is increased and by placing weight upon the lower ski the speed is decreased. There is not the equal distribution of weight which is essential to the full "snow-plow."

When a ski pole is used with the "half snow-plow" method, it should be dragged outside the ski which is gliding straight ahead, not between the skis, as in the case of the "snow-plow." Some skiers get along in good shape as long as the skis run parallel in a straight line, but they are unable to manage coasting turns. Vivian Caulfield and Arnold Lunn, European skiing experts, point out that skis turn much the way a boat does. One ski may be regarded as the boat and the other the rudder. This is a good pointer to keep in mind.

When the skis are running parallel, there is a complete absence of any braking or steering effect. But immediately the skis form an angle, you stop or turn to the right or left.

Mr. Caulfield comes pretty close to the crux of steering on skis when he compares a ski with a skate. When skating on one edge of a rocker skate you can readily cut a clean arc in the ice without there being any side-slipping of the skate. The edge of a ski, however, is far longer and flatter than that of a skate and for these reasons when one makes a curve on skis it is necessary that there be a certain amount of side-slipping. The "half snow-plow" method which I have just described is an example of side-slipping. But, also, during most curves you allow either one or both skis to run flat on the snow instead of on edge for part of the time and, always, close attention must be given to the proper shifting of bodily balance.

The knack of coasting down a long hill, making a series of graceful serpentine curves is by no means difficult after one has learned straight down-hill coasting and braking. It is a combination of these two and follows in natural sequence. In order to make a turn it is necessary to slow down to some extent, and thereby you employ the use of one of the braking methods. The three skiing turns are the "stemming" turn, the Telemark swing and the Christiania swing.

Of these three, the "stemming" turn is the easiest to learn. We will say that the skis are now at an angle; at this moment enters the element of steering. You come to a stop if a sufficient amount of braking power is applied, but if not, you swerve

A SERPENTINE COURSE DOWN A LONG HILL.

either to the right or left. Let us suppose that you are taking a downhill diagonal course and speed has been retarded by snow-plowing with the left ski. You will find that by advancing the point of the right ski, pressing outward with the right heel and keeping most of the body weight on the left ski, you will turn to the left. Then presently,

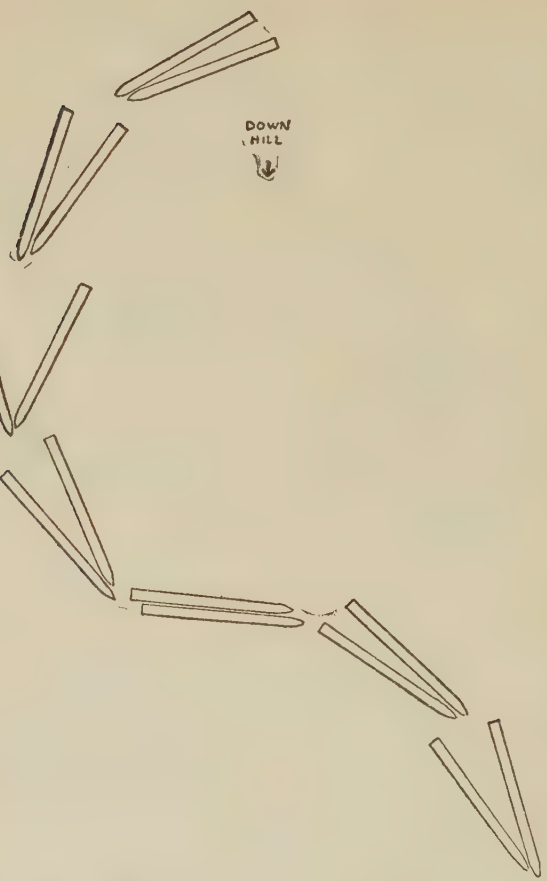
if you reverse this order, snow-plow with the right ski and allow the left to take the lead, you will turn to the right.

A series of connected "stemming" turns of this sort down a long slope is a graceful sight and mighty good fun. Proper balance is of first importance, and the knack of this comes only with practice. At certain stages of the turn one must throw most of the weight on one ski, again on the other, and still again the weight should be evenly distributed. Experience is the best teacher in learning these turns.

I can indicate on paper only the general principles. In practice, one soon learns that a certain edging or flattening of skis and shifting of bodily weight under certain conditions brings a given result. And the next time you wish that result, you know how to get it.

With the possible exception of ski jumping, the high watermark of skiing is the mastery of the Telemark and Christiania swings. Some people never reach this stage. Yet both swings are merely an application of edging and side-slipping with skis during the course of a turn.

The Telemark swing is a one-foot turn; that is, practically the whole weight of the body is on the forward ski and it is this ski which does all the work, the other following amiably behind, hardly more than an appendage. The "Telemark posi-



AN APPROXIMATE IDEA OF THE POSITIONS OF THE SKIS DURING A STEMMING TURN TO THE LEFT AND PREPARATORY TO ONE TO THE LEFT.

tion," the position of the body during this swing, is distinctive and not always easy to acquire unless one practices it a bit on level ground before trying a hill.

When about to make the Telemark swing, the point of one ski is lunged far ahead of that of the other, so far in fact that the point of the trailing

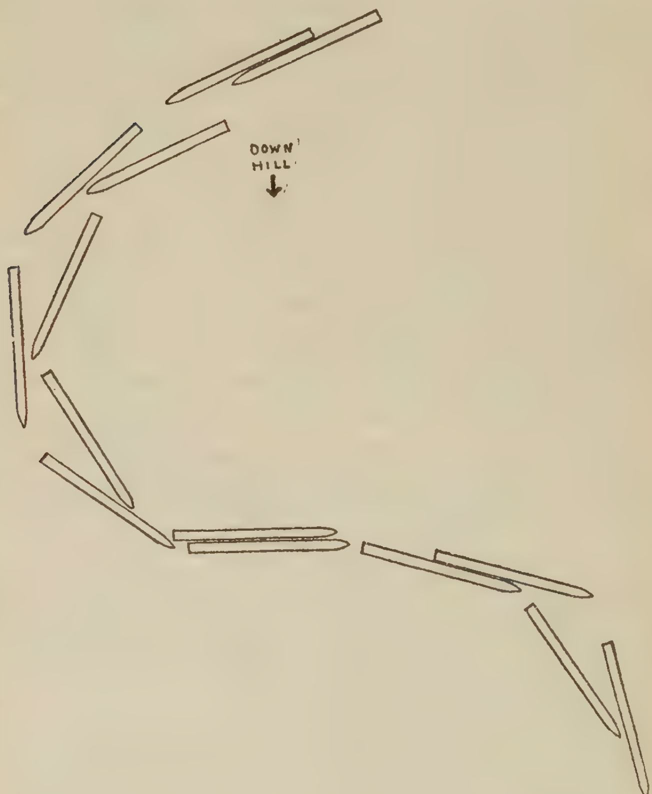
THE TELEMARK POSITION AND HOW THE RIGHT AND LEFT SKIS LOOK DURING A SWING TO THE LEFT.

ski is opposite the foot of the leading ski. This means of course that the rear knee is bent to such a great degree that it is almost touching its ski, which is the Telemark position.

A Telemark swing, about three quarters of the way through, may become one of a series of curves making a serpentine course down a slope. But a Telemark which is carried to its logical finish brings you to an abrupt stop facing uphill; it is

commonly used in this respect as the finishing touch of a ski-jump.

Now, the leading ski, the ski which does all the work in this swing, may in one case be the right



AN APPROXIMATE IDEA OF THE POSITIONS OF THE SKIS DURING A TELEMARK SWING TO THE LEFT, TO BE FOLLOWED BY ONE TO THE RIGHT.

and in another the left, depending wholly upon the direction in which you wish to turn, but in either case it is the outside ski so far as the uphill side of the slope is concerned. If you turn to the right, the left ski leads; if to the left, the right ski leads.

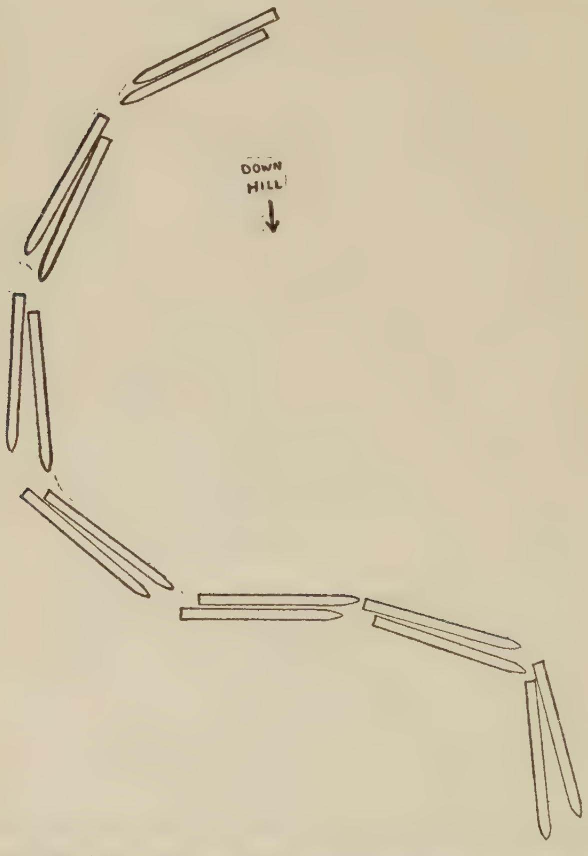
During this swing the leading ski is slanted so that it runs on its inside edge. At the same time the heel is pressed outward and some effort is made to press the point of the ski inward. The rear ski lags behind at a sharp angle to the leading ski.

The Christiania swing differs from the Telemark in that it is more abrupt and the weight instead of being wholly on one ski is more evenly distributed between both. During this swing the skis are nearly parallel and both are slanted to run on their edges. The action is comparable in some respects to that of suddenly edging a pair of skates against the ice in order to come to an abrupt stop. The inside ski leads.

I think I have made it fairly evident that in skiing, as in golf or swimming, one must first learn the rudiments of the game and then proceed step by step. It is a building-up process in which almost every movement one makes bears a direct relation to something that has gone before. But at the same time, just as in golf the art of putting bears slight relation to the golf swing, and in swimming a graceful dive is hardly a part of the swimming stroke, so in skiing are there certain actions

which, strictly speaking, are not a part of the skiing glide.

Included in this category might be the jump turn. This is a unique, sometimes thrilling method



AN APPROXIMATE IDEA OF THE POSITIONS OF THE SKIS DURING A CHRISTIANIA SWING TO THE LEFT, TO BE FOLLOWED BY ONE TO THE RIGHT.

of coming to an abrupt stop when coasting downhill in a diagonal course. Neither of the two braking methods previously described is used in connection with this. You coast down at high speed, skis close together and parallel.

We will assume that the lower descent of the slope is to your right. When ready to make the jump turn, you go down onto your knees preparatory to a good spring, then lean forward with the ski pole in the right hand and quickly jab this into the snow near the point of the lower ski. You hold tightly to the pole and as you flash up to it give a quick spring into the air and around to the right. The skis land on the snow with a shocked thump and remain stock still. All this happens in a fraction of the time it takes to tell about it. One needs to work fast.

A trick which every skier should learn early in the game is that of turning-about-face. This is commonly known as the "kick-turn." Without this trick the process of turning around with a pair of seven-foot skis attached to your feet becomes a time-taking and awkward performance. To turn-about-face proceed as follows:

We will say that you wish to turn in the direction of the right. Raise the right leg so that it is nearly at right angles to the body. As a result this ski is brought into almost a vertical position, the end resting on the snow. Slowly turn the point

of the ski backward in a semicircle and bring it down to the snow parallel to the left ski. The two skis are now pointing in opposite directions. Raise the left ski from the snow, swing it over the end of the right and then around beside it, and you have completed your about-face.

Either on a slope or level ground one cannot make satisfactory progress if snow sticks to the

RUBBING OFF STICKY SNOW BY TURNING ONE SKI ON EDGE.

bottoms of the skis; as oftentimes happens on warm days. An application of ski wax is the best preventative. Very often, snow can be loosened by stamping hard several times and then rubbing

FIRST POSITION IN THE KICK-TURN.

SECOND POSITION; HALFWAY AROUND.

FINAL POSITION; ALL THE WAY AROUND.

each ski back and forth on the ground. If the snow continues to stick, turn one ski nearly on edge and run the bottom of the other ski across it at right angles behind the foot.

In order to know the thrill of coasting down a hill one must first climb up it, and this, the unwritten law warns us, with skis attached. Although skiing is essentially a sport of skill, it may be said that climbing sometimes comes close to being hard work. Yet a great deal depends upon one's method.

Easy, gentle slopes can often be mounted with the ordinary skiing glide used on the level stretches. Even steep slopes can be taken after the same manner provided one goes up in a zigzag course like that of a trail horse climbing a mountain. In either case, however, there are times when the slope becomes so steep or the snow so slippery that you begin to slip backward, and at this stage it is wise to raise the front end of the ski slightly at the end of each glide and press down. If you continue to slip back, slant the skis slightly and turn the front ends outward at the end of each glide. The turn-about-face method I have described can be used to advantage while zigzagging up a hill, but only in spots that are fairly level underfoot. If you begin to slip downhill before getting all the way around with this trick, you are likely to have an uncomfortable fall.

It is possible to walk straight up a steep snow slope if a method variously known as the "fish-

THE "FISH-BONE" METHOD OF CLIMBING A HILL.

bone" and "herringbone" is used. This is quicker than zigzagging but more tiring. The skis are lifted completely from the snow with each step and

planted at an angle to each other. Of course if they were parallel one would take a fast backward journey to the bottom of the hill. The front ends of the skis must be widely separated, pointing outward. The steeper the hill, the greater must be the angle thus formed by the skis.

Another method of climbing a hill on skis is that of going up crab fashion. As with the "fish-bone"

A CLIMBING METHOD WHICH IS LIKE WALKING UPSTAIRS SIDEWISE.

method, the ski is lifted from the snow with each step, but instead of facing the slope you go up sidewise. The skis are parallel and horizontal.

You drag one up beside the other in much the same way you would climb a stairway sidewise.

In Europe it is customary to attach strips of sealskin to the bottoms of skis when mounting long hills. These are great helps in preventing back-slipping. An additional advantage of sealskin is that you can glide upward on it. A small rope which is run around each ski in a series of half hitches also saves one from much back-slipping but you are forced to lift the ski with each step upward.

Whichever hill-climbing method is used, one will at first reach the top flushed and puffing. But after a time one begins to appreciate the futility of useless expenditure of energy and then one realizes that there is quite as much invigorating thrill to skiing when it is taken easily as when hard work is made of it.

CHAPTER IV

THE HIGH ART OF SKI JUMPING

IT is interesting to trace the development of some of our competitive sports. Now and again we come upon a sport quite able to stand upon its own feet but which originally was an offshoot from other pastimes. Take hurdle racing and running broad jump for example. I am willing to hazard a guess that both of these highly specialized sports developed from cross country running with its numerous obstacles.

It is much the same way with the always spectacular ski jumping contests. As practised today over specially constructed jumps, here is a game that has grown quite away from its parent, the easy-going ski running across a white blanketed countryside.

The beginnings of ski running are buried so deep in the archives of Norse history that no one can say just when it started. The origin of competitive ski jumping, however, is much more recent. In fact, ski jumping is such a natural development of the cross country ski runs which have been going on for ages that one is surprised that it has not

made its appearance long before. But it is only within the past fifty years that the ski in its native home, Norway, has been thought of in the light of a sport. Before that it was simply a means of getting from one place to another.

Jumping of sorts was all a part of the day's walk. When the Norwegian farmer boy coasted downhill and came to a large boulder covered by snow he didn't take the trouble of going around it. He kept right on and jumped from the top of this natural take-off.

In due course of events it occurred to him that these small jumps were very good fun of themselves and offered possibilities in the way of competition. Then, back in the rural districts came artificially constructed jumps and organized meets among the farmer boys.

The city heard about these meets and became interested. The citizens of Christiania forthwith constructed a large jump and sent out word that a big annual meet would be held. The first one was held in 1879. The country boys flocked in and as might be expected took all the laurels. The city contenders were new at this ski jumping game and made a poor showing. A farmer boy named Torjus Hemmestvedt became the first world champion ski jumper by making a jump which was considered quite phenomenal in that day. Hemmestvedt jumped 76 feet.

This first meet was epoch-making in the history of the ski. Before this time few people outside of Norway had even heard of the sport, but from this time on the fame of ski running and ski jumping spread throughout the entire world. Hemmestvedt's record jump stood for fourteen years. Then he made a trip to the United States. It is interesting to note that the second record jump in the history of ski jumping was made in this country. At Red Wing, Minnesota, the champion topped his previous record and jumped 103 feet.

Competition in this spectacular, hair-raising sport was now becoming keen all over the world, but the Norwegians managed to hold their own against all comers. One hundred and three feet stood unassailed until 1898 when two other Norwegians, Cato Aal and Sven Sollid, both tied at the annual Christiania championship meet, topping the former record by a bare six inches.

In the following year in Christiania we again find the unusual situation of two men tying for a new record. This time they were Asbjorn Nielsen and Morten Hansen. These men jumped 107 feet. Records didn't seem to last long at this stage of the game, for in 1900 Olaf Tanberg made a distance of 126½ feet, and in 1902 Paul Nesjo, an eighteen-year-old boy, made the surprisingly big jump of 130 feet. When this was followed in the same year by Nils Gjestvang with 134½ feet,

everybody said that an unassailable figure had been reached in ski jumping records. And for a number of years this proved to be the case.

Harald Smith came along in 1909 and in a meet held at Davos, Switzerland, made a jump of 148 feet. Since that time we have ceased saying that a given record is unassailable. And with reason, too. In 1907, at Steamboat Springs, Colorado, a ski jump of 203 feet was made by Henry Hall. In 1920, at Dillon, Colorado, a jump of 214 feet was made by Anders Haugen. And in 1921 at Revelstoke, B. C., Henry Hall smashed all previous records to smithereens by making the astonishing jump of 229 feet, although this figure is not always accepted as being strictly official.

From 76 feet, a record that remained unassailed for fourteen years, to 229 feet—this in a single generation. Perhaps automobile racing is the only other sport which can show such an astonishing development in comparative records. Furthermore, in the case of automobile racing it has been mainly a history of the development of mechanics.

In ski jumping the same element holds true to a certain extent in that jumps have been specially constructed within the past few years so that the ski jumper could make more distance. At the same time, the element of human skill is by no means a negligible quantity in this matter. If you wish proof of this, just watch two different men

going over the same jump. The skillful jumper will make twice the distance of the other man under precisely the same conditions.

I will describe the manner in which an average ski jump is constructed, the sort of jump upon which competitions are held, the type commonly referred to as a "big" jump. This consists of an "approach," "take-off," "alighting ground," and "outrun." At the top of the approach there is usually a high wood trestle which supports a long snow-covered wood incline. The jumper starts on his lightning way at the top of the trestle and coasts down the incline with ever-increasing speed.

About halfway down the hill he reaches the "jumping-off place," with the take-off at the far end. It consists of a level snow-covered wood platform perhaps fifty or more feet long and anywhere from seven to fifteen feet above the ground at its outer end. At the near end it joins the side of the hill. The jumper reaches the outer edge of the platform at tremendous speed and leaps off into thin air.

The distance of the jump depends to some extent upon the amount of speed which has been acquired during the coast down the approach. One time I went down the big jump at Dartmouth when the snow was soft and sticky, with the result that my speed was so retarded that after leaving the take-off I jumped barely ten feet. Yet, in or-

Courtesy of Alexander Taylor.

THE VARIOUS POSITIONS OF A SKI-JUMPER AFTER HE HAS WHIZZED DOWN THE "APPROACH" AND ARRIVED AT THE "TAKE-OFF."

dinary ski coasting down a slope on fast snow I have jumped from a slight natural mound in the slope and made twice that distance. A big jump on a slow day is unusual. But on a fast day, you surely do hum.

Taking into consideration the skill of the jumper, which is a very important element, and given the right snow conditions, just so, the greater the amount of speed and the farther the jump. There are, however, other important elements in distance-making. One of these is the height of the take-off. Imagine, for instance, two take-offs at the lower end of an approach, one twice as high as the other. All things being equal, you will *not* jump twice the distance from the higher take-off than the lower but you will jump an appreciable distance farther. And you will go twice as high up in the air.

Combined with the element of speed down the approach and height of take-off is the grade of the hill below the take-off. The steeper this hill is, the longer the jump will be. Steepness in this lower hill is really a more important element in distance-making than steepness of the approach and for this reason most big ski jumps are constructed accordingly. The angle of the lower slope will be somewhere between thirty and thirty-five degrees while that of the approach may be between twenty and twenty-five.

There is a more important reason than distance-making for the lower slope or alighting ground of a well constructed ski jump being steep. If it were not so there would be a great many very serious accidents in this sport. There are, of course, some accidents as it is. Every now and then an arm or leg is broken.

People wonder at the scarcity of fatal injuries in ski jumping. The reason is that the jumper meets the snow instead of hitting it. If there is any blow at all it is a glancing one. There is none of the shock which one receives from falling from a height to level ground. Provided the jumper meets the alighting ground right, he coasts on down the slope at great speed and presently reaches the "outrun." This is more level ground. He executes a telemark swing and comes to a halt, facing uphill.

Of course, "big jump" ski jumping is not for the novice. One should begin in a small way, practice as the Norwegian farmer boys did in their cross country ski runs. But if you wish to know how it feels to go over a big jump for the first time, you will be interested in the delightful account which Fred Harris gives in *Outing* of his maiden effort. Since then Mr. Harris has become one of the most expert ski jumpers in the country. He tells the following story of his first trip down the big Montreal jump:

"Soon the competition started and one after another the jumpers shot down the long hill, across a wooden trestle spanning a road, out on to the take-off, and launched themselves into the air. I gasped at some of the spills when it seemed as if the jumper would never pick himself up alive and I marveled at the skill and 'form' of the better jumpers. I believe the longest jump that day was ninety feet. It seemed a terrific leap to me.

"After the jumping was over and the crowd began to disperse, I inadvertently remarked to my father, 'I have a good mind to go up and try that jump once.' He didn't say much, but his attitude seemed to say, 'You have done a lot of talking and it's about time that you gave us a rest or else come across with the goods.' (I afterwards found he didn't want me to try it at all.) The hill looked worse every time I glanced at it, but feeling that I would never hear the last of it if I didn't make good, I climbed to the top of the hill and put on my pair of home-made skis which I brought with me. I have since thought how those expert Montrealers must have smiled to see me with my home-made outfit.

"There were several other jumpers at the start and I watched them go one by one. I scarcely noticed what happened to them as I was so concerned over my own impending fate. The last man went down and then I knew it was up to me.

If the hill had looked bad from below, it was appalling from above. It seemed to me if I went over that jump I couldn't help but land on the roof tops of the city so far below. I confess that it was one of the hardest things I ever did to force myself down that hill.

"I didn't dare to look at the jump when I started. I looked at a point about twenty feet down and let the skis carry me away. By that time I was committed. The speed increased, the scenery flew by, and the tears began to stream out of my eyes. I could see the jump coming nearer every instant and it looked like a precipice. I knew nothing about the correct way of making the spring from the take-off and my form was the worst possible.

"I attempted to spring, but I doubt if I was more than half erect when I shot off the jump, home-made skis and all. It seemed to me as if I would never land. Finally my skis touched the snow. I had only gone seventy feet, but it seemed a long distance to me. Things began to happen right away. I lost my balance and fell back on to my hands. Somehow, I was able to get up on my skis and rushed on down the hill.

"What to do was the next question. I knew nothing about making a telemark swing and instead of making a curve and stopping I shot over a sidewalk, banged across a trolley track, and finally

came to a stop after going several hundred yards down a street. I was surprised to find myself none the worse for my experience. My father said he had never seen such an expression on any human countenance as there was on my face when I went off the jump."

Although Mr. Harris' method of taking the bull by the horns, as indicated by the foregoing, proved peculiarly effective, it is not one which can be recommended to the average skier. But as I have said before, let the average skier learn jumping in a small way and the time may come when he will tackle jumping in a big way.

Small jumps offer rare good fun. They are, or should be, patterned in all important particulars after the big jumps and the manner of jumping is (or should be) the same. If you have a hill with a good approach and suitable alighting ground it is a simple matter to build a home-made ski jump. All you need is a jumping platform and in this respect a mound of piled-up snow answers about as well as anything. Start, say, with a pile two feet high at the take-off and gradually add to height as courage allows. It is well at first to give this snow platform something of a downward slant. After learning to balance properly and recover quickly on landing you can build it more nearly level.

A point which I cannot emphasize too strongly is that of choosing an alighting ground having a

sufficient degree of steepness. And be sure that the steepness continues for a fair distance beyond the point where the longest jump will be made. If the alighting ground has a tendency to flatness I am willing to predict that somebody who goes over that jump will break a leg. Furthermore, it is risky to jump into crusted, or deep or sticky snow; these dangers can be overcome by treading down the snow on the alighting ground.

A ski jump is not the process merely of coasting down the slope and allowing oneself to be carried over the take-off. It is a real jump, a jump out and down rather than up. In starting downhill to the take-off assume the normal coasting position; that is, with body erect but leaning slightly forward so that it is at right angles to the slope of the hill. As you approach the jumping-off point, crouch down so that hands almost reach ankles. Still keep the body bent forward.

On reaching the jump straighten out the body quickly and throw the arms forward and upward. Spring into the air. While in the air the skis should be parallel to the slope and together. To accomplish this, press downward with the toes and continue to lean forward.

At the time of jumping and during the flight in the air the legs should be together. On landing, advance one ski and bend the knee of this leg. Learn the Telemark swing and before long you

will be able to finish the jump with a quick halt, facing uphill. A final word—never jump with a ski pole in your hand. If you do, you may land on the point of it.

CHAPTER V

WALKING ON SNOWSHOES

EXTRA big feet are needed to hold you up when the snow is knee deep or more. Human feet are not built right for deep snow navigation. They are altogether too small and dainty. Snowshoes in common with skis are extra big feet. They are distinctly more than mere pedal appendages. They are, for the time being, almost a part of your flesh and bones. Learning how to walk on snowshoes is simply the process of becoming accustomed to the vagaries of a new pair of feet. This does not take long, for you already know how to walk.

Proper selection in buying a pair of snowshoes is very important. Unless you get a pair which are of the best quality obtainable and of size and model best adapted to your own weight and particular use, you may have a laborious, perhaps agonizing winter tramp. Fragile, poorly-made snowshoes are subject to distressing ailments—the frame often breaks and the webbing sags. When you walk under either or both of these handicaps, each step is like lifting a ton weight. Presently,

the tendons of your legs give out and there ensues an agony of piercing needles.

The best-made snowshoe breaks at times but as a rule it can be readily mended. When a poorly-made snowshoe goes back on you, however, the collapse is likely to be almost as complete as that of Oliver Wendell Holmes' wonderful one-horse shay. The whole structure goes, and if you are a long way from home when this happens you are in a serious fix.

Only after you have walked on snowshoes will you realize the numerous severe strains which these webbed feet go through. In addition to the constant weight of your body, there are many wrenches from half-buried stumps, submerged brush and fallen trees. The wood from which the framework is fashioned must be of a variety that will stand these wrenches. It must be fairly light and flexible yet at the same time tough and capable of holding its shape. White ash is generally conceded to be the best wood for the purpose. The wood should be straight-grained throughout. Any suggestion of cross-grain is to be avoided.

The parallel wood cross-bars, one in front of the toes and the other behind the heel of the boot, should be carefully mortised into the frame. A slovenly job of mortising means that these bars will work loose under strain. At the point of contact where the two long ends of the frame meet

to form the tail, these should be riveted together and held with copper burrs. Sometimes screws are used instead of rivets but screws are liable to break.

The stringing, more generally known as the "filling," must be of a sort that will neither sag nor stretch. In the average well-made snowshoe, the filling at the extreme front and rear consists of fairly lightweight strands of lamb's hide. The filling in the center of the snowshoe upon which the foot rests must be of much heavier material. At one time, caribou hide was used extensively for this purpose but in practically all snowshoes made to-day the material is cowhide. Properly treated cowhide is about as good. Some manufacturers have two grades of filling but it is always wise to get the best.

The size of the meshes formed by this central filling varies to some extent in different snowshoes. If the shoes are to be used in a locality where the snow has a tendency to be fine, feathery and dry for a great part of the time, it is wise to choose a fairly small mesh; or in other words, one which prevents the shoe from sinking too deeply down into the snow with each step. On the other hand, in localities where moist snow prevails, a large open weave is more suitable. The latter, perhaps, meets more nearly average conditions. The advantage of the open weave lies in the fact that when one is

walking through wet, sticky snow, the snow does not cling to the webs to the same extent that it is likely to do with the fine weave.

The strands of the central filling should loop completely around the outer sides of the snowshoe frame. This rule does not apply to the lighter filling in front of the toe and behind the heel. In these two instances, the filling is usually passed through small holes bored in the frame, much after the manner of stringing a tennis racket.

Snowshoes may be divided into two general types. One of these is tailed and the other is tail-less. The most commonly used is the ordinary tailed type with which everyone is familiar. There are numerous variations of this type. In Alaska there is used a strange model which may perhaps be classified in this general type, in spite of the fact that it is eleven feet long and has more the lines of a ski than those of an ordinary snowshoe. The sides are nearly parallel throughout the length of the shoe and the forward end turns up abruptly, like that of a ski.

Admiral Peary when in the Arctic developed a distinctive diamond-shaped type of tailed snow-shoe having considerable length, and in the country south of Hudson's Bay there are frequently found shoes having a length of eight feet. There is a very good reason for the extreme length which is characteristic of almost all snowshoes used in the

environs of the Arctic. The nature of the country demands length. The snow is fine, dry and powdery. A compactly built shoe would sink far below the surface and walking would become a laborious task. The rangy surface area of the long shoe in common with that of a long ski prevents it from sinking deep.

Another reason for the long, narrow snowshoe is the capacity for making a well-packed trail, which is a factor of extreme importance in the far North. A solid pathway is formed and although snowstorms may come, the wind will keep this path fairly clear of snow. The traveler may find his way back to his starting point by the same route which he has taken in going. When the snow is very dry and powdery, a single trip by one man on long snowshoes will leave a solid trail of this sort. The same result, of course, can be had with the use of short, more compactly built shoes, but not so effectively. In this case, the feet of two men are necessary in the making of a well-packed trail.

Apart from the two prime advantages which I have named, the extremely long snowshoe has distinct disadvantages. On the mainland of the United States there is not the same need for a long snowshoe which exists in the North country. A more compact shoe is far more suitable to the locality. Here, you never find a shoe which is

more than five feet long and comparatively few of these.

Five-foot tailed snowshoes of this sort (which are long shoes of the North in slightly modified form) are classed as racing shoes and are fine for speed or racing over long open stretches of dry snow, such as are found in the prairie country of the Northwest, but they are seldom suitable for either the mountains of the West or the mountains and rolling country of the East. The racing shoe is difficult to turn with and can get one into all manner of trouble in a brushy section. It is designed for straight ahead work in a level open country.

For general all-around use, the tailed snowshoe model most suitable is one sometimes familiarly known as the "pumpkin-seed." This variety of shoe together with slight variations of it is more generally used than any other in sections where the average person goes snowshoeing. Its lines are similar to those of the racing shoe except that it is wider and at least a foot shorter. It is made in various sizes ranging up to fifty inches in length and from twelve to fourteen inches in width.

The right size when selecting such a snowshoe depends mostly upon your weight. An especially big man needs an extra large and strong pair, while a lighter person can get along better on a smaller pair. There are no standard sizes in

snowshoes as there are in ordinary shoes. Each manufacturer has his own sizes and these, as a rule, differ from the other fellow's. For this reason, any figures I give in this connection must be accepted only in a relative sense and they are not to be taken as accurate for all snowshoes.

The boy's size snowshoe, as a rule, averages thirty-five inches long and eleven inches wide. This is suitable for persons weighing up to one hundred and twenty-five pounds. Small children can wear this size, but smaller shoes are better. A person weighing between one hundred and twenty-five and one hundred and seventy pounds requires a pair at least forty-two inches long and at least twelve inches wide. For persons between one hundred and eighty and two hundred and twenty pounds, a shoe forty-eight inches long and fourteen inches wide is needed. A man having very long legs can perhaps use the forty-eight inch length, even though his weight is under one hundred and eighty.

The right sort of tailed snowshoe is *unevenly* balanced. The greater part of the weight should be toward the rear so that while walking, the tail drags behind, thus serving in somewhat the same capacity as the rudder of a boat. It keeps the shoes pointed ahead on a given course.

A common way of testing for unevenness of balance is that of laying a snowshoe on the floor

and placing your fingers under the forward part of the central, heavy filling. The forward part of the shoe will be slightly lifted but the tail should remain flat on the floor. If the tail comes upward it means that the shoe is too evenly balanced for your purpose.

Some snowshoes are as flat as a pancake on the bottom, but as a rule there is an upward curl at the front end. This curl tends to easier walking. In the long, narrow racing type of snowshoe the toe of the shoe is sometimes turned up as much as four inches. But in the all-around, shorter shoe, the curl should not be more than two inches high and preferably less.

The special domain of the tailed type which I have just described is either a flat country or a pleasantly rolling country not too thickly timbered. The tailed snowshoe under such conditions is the only suitable type. But when you get into tangles of thick, heavy underbrush or begin to climb the steep slopes of mountains, you find that the tailed snowshoe is not without its shortcomings.

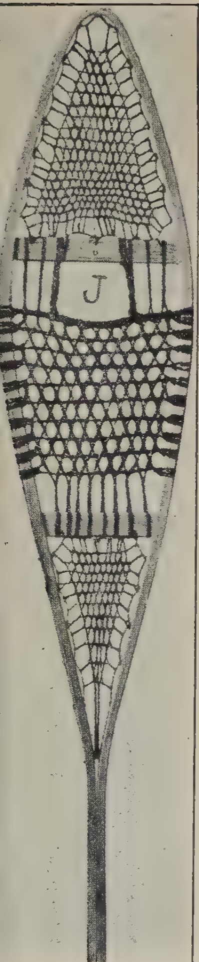
In the brush, the long tail catches and throws you. While climbing a steep grade the tail, because of its weight, droops down hill and this makes it difficult to dig one's toes into the side of the mountain for a firm purchase. There is a constant tendency to slip backward. When descending the mountain, the reverse is true, although the

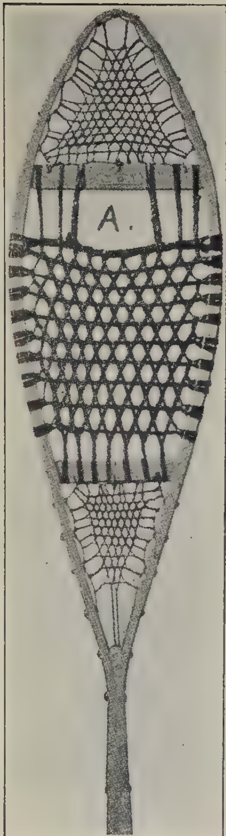
tails are just as much in the way. In this case, you try to dig your heels in to prevent too great speed, but the presence of the tail seriously interferes with the proceeding.

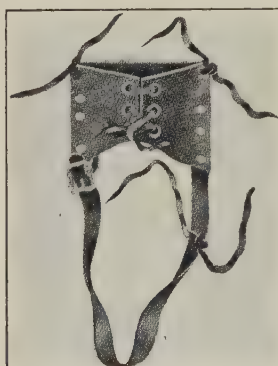
The tail, which is such a great help while snowshoeing in the lowlands, becomes something of a nuisance when worn either in thick grasping brush or on steep slopes. So, by the simple expedient of doing without tails we have webbed feet which are far better suited for these particular conditions.

This is the other general type of snowshoe and it is commonly known as the "bear paw."

My statement that the "bear paw" is the most suitable type of shoe when traveling through brush will probably meet with universal agreement. But my statement that the bear paw is also the most suitable shoe for climbing may have the effect of starting more than one argument. For this point is a moot question. Some people declare that a tailed type of shoe is more effective on slopes than is the bear paw. A tailed shoe, to be sure, having a short tail may work very well under these conditions, but taken all in all it has been my own experience that the bear paw is the easiest shoe to climb with. Another point which commends it for climbing is the ease with which it can be carried when not on the feet. When one gets above timber line in high mountains, snowshoes usually come off and ice creepers are substituted.







J. A RACING IODEL OF SNOW-HOE.

A. POPULAR 'YPE FOR GEN-RAL USE.

F. USUAL TYPE OF "BEAR PAW."

K. THE "HORSE-COLLAR."

ABOVE: SNOWSHOE BINDING.

The bear paw is an *evenly* balanced shoe and for this reason it is quite as much out of place in the open lowlands as is the unevenly balanced, tailed shoe on the heights. The construction of the stringing of the bear paw is similar to that of the tailed shoe, except that in some instances the front and rear lightweight strands are eliminated entirely. The shape of the frame, as a rule, is like that of a slightly elongated letter O, although this also is open to slight variations. In the West there is used a distinctive model known as the "horse collar."

The test for unevenness of balance which I have mentioned in connection with the tailed shoe does not apply to the bear paw, for in this case you want even balance. Likewise, the bend at the front should be very slight, not more than three-quarters of an inch high. A greater curl at the front is a serious drawback when digging one's toes into the side of a steep slope. For persons weighing up to one hundred and seventy pounds, a bear paw twenty-seven inches long and thirteen inches wide, or say, twenty-four inches long and fifteen inches wide, will do. A heavier man needs a shoe that is thirty inches long and fourteen or fifteen inches wide.

The respective spheres of usefulness for the tailed snowshoe and the tailless bear paw are so

wide apart that it is wise to plan to own a pair of each of these types of webbed feet.

A good foot-binding is an important adjunct to the snowshoe. The most simple harness is a length of wide, flat lampwicking looped over the toe; the two ends are run through the stringing on either side of the foot and brought upward through the toe opening of the shoe, then lapped several times and finally passed diagonally across the toe and fastened above the heel. But unless one knows to a nicety the knack of tying and adjusting a home-made harness of this kind, it is likely to give trouble. The average snowshoer will find the manufactured harness more satisfactory.

In selecting a harness, get one that can easily be gotten out of in a hurry after a tumble, one flexible enough not to wrench your foot. Make sure that it will neither chafe the feet nor allow the toes to work forward and come into contact with the forward cross-bar while going downhill. A strap which is too tight across the tops of the toes will wear these to raw meat and if your toes come constantly in contact with the cross-bar you will suffer another kind of agony. My poor toes almost ache at the very thought of an agonizing mountain trip I once took wearing a harness having these shortcomings.

The most satisfactory type of harness I have found is a simple leather pocket or toe cap, open at

both ends and lashed to the stringing of the shoe. The toes fit into this and the straps from either side run back around the ankle.

Fairly high, soft-soled moccasins, large enough to accommodate three pairs of wool socks without binding the feet in any way, represent the favorite

GOOD SNOWSHOE FOOTGEAR; FAIRLY HIGH MOCCASIN AND LEATHER POCKET HARNESS.

type of snowshoeing footgear. There is no better boot for the purpose, in my opinion, although there are those who prefer flat-soled rubber hunting-boots. Ordinary rubber arctics can sometimes be worn, although these are not recommended for steady use.

Whatever the boot may be, it must be devoid of a heel. The grinding of a heel completely ruins the snowshoe stringing in no time. A useful temporary expedient when there are no heelless boots about is that of laying a square block of sole leather over the stringing upon the spot where the heel

will descend and fastening this with thongs of the stringing.

Stiff-soled boots, even though they be devoid of heels, hardly permit the full play of muscles which snowshoeing demands. There is a greater amount of flexibility to the foot than in the case of skiing. And the soft-soled pliable moccasin is about the only type of footgear which satisfactorily gives this.

Snowshoeing looks easy and it is easy, immediately a beginner finds his snow legs. Within an

POSITION OF THE HEEL JUST BEFORE THE FORWARD STRIDE.

hour after a person puts on snowshoes for the first time he is reasonably at home on them. There are few sports which can be learned so quickly. The reason for this is that ordinary walking and snowshoe walking are fundamentally the same. At the same time, there are noteworthy minor differences.

When walking on a city pavement, the heel is only slightly raised, but in the snowshoe stride the heel is raised very much higher. Indeed, at the moment when the rear snowshoe is about to be brought forward, the bottom of your rear foot is practically vertical. During the greater part of the forward stride the heel is above the stringing and even when the snowshoe is planted forward and the heel sinks down upon the stringing, too much weight must not be placed upon the heel or the tail of the shoe will sink deep into the snow.

In bringing the rear foot forward, there are two tendencies to be guarded against. One of these is keeping the feet far apart and the other is walking with the feet too close together. In one case, you will use up a lot of energy and in the other, bark your shins. Somewhere between these two extremes is correct. The rear shoe should come up with a forward and outward movement, just enough to clear the other ankle.

When both snowshoes are on the snow, the rear narrow part of the forward shoe and the wide front part of the rear shoe should fit close to each other, but not quite touch. The correct snowshoeing stride gives this result. During this stride the shoe is lifted only high enough to clear the surface of the snow. The action is something of a scuff, not wholly unlike that of scuffing along a floor in a pair of old carpet slippers.

To the beginner, snowshoeing is likely to prove tiring work. Thigh and calf muscles which have not been exercised for a long time come into play

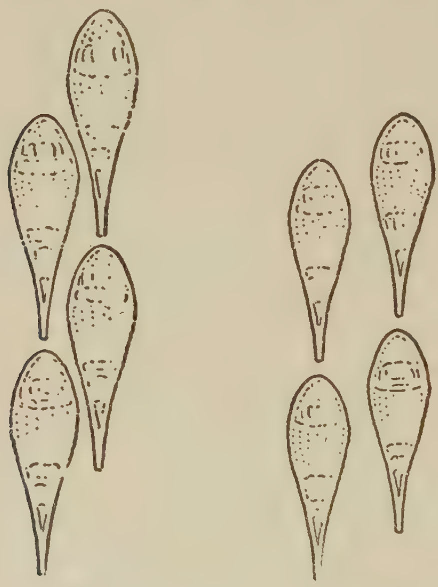


Fig. 1 Fig. 2

FIG. 1. AN APPROXIMATE IDEA OF HOW THE SNOWSHOE IMPRINTS SHOULD LOOK. FIG. 2: HOW THEY SHOULD *not* LOOK.

and it is wise to take things in a leisurely fashion at first. Instead of tying the muscles into hard knots, allow these to relax. Let the hip action be loose and easy, and slightly bend the knees.

Tumbles will come, one of the first when the beginner tries to make his first turn. Unless I am

greatly mistaken, he will allow the tail of one shoe to swing over upon that of the other and then try to lift the under shoe. It's often tried but it can't be done. A tumble comes in natural sequence. Likewise, when he tries to step backward.

When you travel any distance on snowshoes, be prepared for any break in the stringing, harness, or frame. Take along a supply of rawhide and several buckskin thongs. Even though the frame snaps, you can splice this with a piece of wood and rawhide. A Boy Scout's knife serves as an excellent pocket tool kit to use in conjunction with these. Any break should be fixed immediately or else it will get worse, and more serious, your legs will give out as the result of walking upon disabled snowshoes.

The life of a snowshoe is largely dependent upon the sort of care which it receives. It can be ruined in one season or it can be made to last several. A snowshoe receives enough unavoidable wrenches and strains without adding to these when it is unnecessary. To stand with your snowshoes suspended between two rocks or fallen trees is an avoidable strain. Jumping, although undeniably good fun, does not add to the life of the snowshoe, for you may land on a buried rock or stump that will bring ruin to the stringing. Sliding down hill on snowshoes is another sport that is wearing upon the stringing.

When you come home after a day's tramp with wet snowshoes, they should be dried out, but it is important that they be dried out slowly. Do not place them behind the stove or too close to an open fire; a great amount of artificial heat ruins the webbing. Once a year, it is a good idea to give snowshoes a coat of spar varnish but they must be thoroughly dry at the time. At any time that the stringing gets especially dry, a coat of neat's foot oil will do it good. When you put your snowshoes away for the summer, hang them by wires from the rafters so that rats and mice cannot get at them. These pests find the stringing an especially dainty morsel.

CHAPTER VI

THE VARIED USES OF A TOBOGGAN

THE toboggan was invented by the North American Indian in the distant past, but its break-neck, mile-a-minute speed is wholly a modern innovation. The Indian was never so easily intoxicated with speed as some of us moderns, so perhaps that is why he did not go in for coasting.

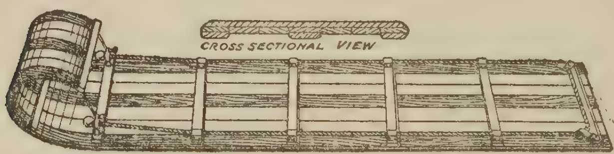
If the ghost of the Indian who invented the toboggan could see the result of his handiwork, it would probably be the most surprised ghost that ever walked. And yet, strangely enough, the manufactured toboggan of to-day is in all essentials the original, primitive Indian implement.

The toboggan was born of necessity, and in the hands of the Indians has always remained a work cart. It was a moving van, a carry-all with which to lug household goods, furs and meat across the wide stretches of the snow-buried North country. In the eyes of the Indian there was no more romance or thrill to a toboggan than there is in a delivery wagon to the corner grocer.

The word "toboggan" has come into such general use that it may mean almost any kind of implement of winter sports upon which you slide

downhill. It is something after the manner in which the word "trout" is used in some parts of the South. Not long ago I met a man from Georgia who told about catching a trout weighing twenty-one pounds. Down in Georgia most any fish that swims is a "trout." The real toboggan is as distinctive as the real trout.

The particular implement to which I refer is a marvelous combination of flexibility, grace, strength, lightness and speed, that weighs only



THE HILL-COASTING TOBOGGAN.

about ten or fifteen pounds—in some few instances not more than five. But this light, frail-looking snow-boat will carry without crack or tremor on a half-mile whizzing trip as heavy a human load as can jam aboard. It is a remarkably simple device — just a flat-bottomed sled consisting of several thin strips of wood held together by cross-pieces. The front end is bent up and over to form the hood.

There are no runners of the sort which you find under the ordinary sled, but sometimes the outside wood strip on either side and the one in the center

are made extra heavy and thus become runners. In some instances the bottom is shod with strips of steel.

Both of these are innovations which the white man has added, just as he has added a small keel to the Indian's canoe. Exceptional speed is possible with the steel-shod toboggan, but it is suitable only for ice slides. Toboggans with wood runners or without any runners at all are better all-around implements, for these can be used on both ice and snow.

The Indian toboggan was usually made of birch, but that of the white man is made of various woods, such as birch, cedar, basswood and ash—all reliable varieties provided the wood is well seasoned and the grain runs straight. The ordinary manufactured hill-coasting toboggan usually consists of seven long strips, having a total and uniform width of about eighteen inches. In some instances the hood, instead of holding a uniform width, tapers together. This arrangement is especially suitable for another use of the toboggan which I will mention further on.

The length of the hill-coasting toboggan may range from four to ten feet. The longer a toboggan is the more people there are who can slide downhill on it, but the heavier it is to haul back. There is no need for an extremely long toboggan unless one wishes to accommodate a considerable

number of passengers. Six or seven feet are convenient all-around lengths.

Passengers may seat themselves in various ways for the slide. In one of these methods, the front passenger sits in cross-legged tailor fashion, while those behind sit astride the toboggan with feet pointing forward, well up out of the snow and inside the side rails or ropes. The last man in the row squats sidewise so that he can see to steer, one foot being dragged behind for a rudder.

Sometimes the rear man wears a toboggan toe cap, a heavy leather foot harness that saves shoe

THE TOBOGGAN TOE CAP.

leather and acts as a brake. In especially constructed toboggan chutes, steering is almost unnecessary, and you go at such a rate of speed that any attempts at braking are likely to prove quite futile.

In another riding position, the passengers lie flat on the toboggan, on top of each other, shingle fashion. The chin of the second person comes above the shoulder blades of the first. The last person atop the human heap can thus see to steer.

The Canadians were the first to see the speeding possibilities of the Indian's slow-moving, fragile-looking carry-all, and tobogganing as a sport originated about a half century ago on the slopes of Mount Royal, Montreal. The sport has always been so popular among the Canadians that most of the towns in lower Canada go to the expense of building a toboggan chute every winter.

We in this country learned about tobogganing from the Canadians, and during the late eighties the popularity of the sport in the United States became quite general. The first toboggan chute was built in Saratoga, N. Y., in 1887, and many similar chutes presently sprang up in the snow and ice zone. It became a profitable commercial enterprise, something of a forerunner to the Coney Island "Chute the Chutes." This Coney Island summer-time thrill is clearly derived from the toboggan chute.

Tobogganing interest in this country died out after a time and the chutes vanished. But during the past few years a notable revival of winter sports has occurred, a new cheerful attitude toward winter has displaced our former dread of the cold season. The numerous winter resorts, such as Lake Placid and Poland Springs, the various winter clubs and snow and ice carnivals taking place from coast to coast, are significant expressions of this new spirit. And the revival of the toboggan holds

a prominent place in this interest. As an expressive instance of this revival I might mention the fact that last winter the city of Saratoga constructed an elaborate toboggan chute, the first it had enjoyed in twenty years.

It is not necessary, of course, to have a toboggan chute in order to coast down hill on one of these light flat-bottomed chariots, but the presence of a chute paved with a sheet of hard, slippery ice adds considerable speed, thrill and interest to the sport. A whizzing, breath-taking ride down such a slide is warranted to appeal forcibly to our native speed mania. And the extent to which it is doing so is evidenced by the great number of chutes of this sort that have recently sprung up all over the country.

Many country clubs have erected toboggan chutes on their premises. This, as a rule, consists of a high sloping wood trestle, somewhat similar to that used in the construction of high ski jumps. There is a platform on top from which the toboggan starts on its downward course.

The trestle work incline gives the toboggan the initial impetus for its whizzing flight down to the natural slope of ground, which starts at the lower end of the trestle. The toboggan, after shooting down first the artificial and then the natural slope, continues on at break-neck speed across a long,

ALL SET FOR A WHIZZING RIDE.

white meadow which may be at the bottom of the hill.

The course of the toboggan during this flight is straight downhill on an iced track two or three feet wide. This track is really a trough, for either side is banked with a foot-high ridge of ice; in some cases there are wood sides. The chute is kept icy by flooding in cold weather. A certain amount of expense is involved in building and maintaining a slide of this sort, but country clubs, as a rule, charge a fee for using the chute, and in this way soon get their money back. The wood trestle work is taken down after the winter is over and packed away for the following season. Any club erecting one of these chutes should carefully study the position of the sun so that the melting is reduced to a minimum.

The Ardsley (N. Y.) Country Club, one of the first clubs to build a toboggan chute, utilizes a steep hill for the initial impetus, the toboggan follows a banked-up, icy course for 2,100 feet, and all told gives a thrilling ride of more than half a mile. At one point a deep, wide gulley is crossed, the chute being carried on a wooden trestle.

The Lake Placid Club in the Adirondacks has hit upon the unique scheme of getting their starting elevation by making use of the roof of the golf house. Several of the Canadian toboggan chutes have a number of tracks side by side, these sepa-

rated by ridges of ice. The toboggan slide on Dufferin Terrace, Quebec, has three tracks, and that of the Mount Royal, Montreal, has five. Such an arrangement gives opportunity for exciting competition.

Perhaps the greatest thrill which the toboggan holds in store is that of going down a ski jump. This body-shaking diversion is indulged in by a few daring souls at Lake Placid every winter, but it is not one which can be recommended for general practice. It is the "belly-bumping" of our boyhood sled days carried to the nth degree.

Thick, heavy cushions on the toboggan are needed for this stunt. While sailing through mid-air one leaves these cushions completely for the time being, and the meeting a moment later is with a resounding whack. One thing that must be guarded against upon landing suddenly after the mid-air flight is a quick jerking back of the head from the shock. If severe enough, this might prove dangerous. The sprawled position, firmly grasping the side rails, is used in this bouncing pastime. Only one person should be on the toboggan.

A more soothing diversion which you find at Lake Placid and many other places in the snow country is the use of the toboggan as a sleigh. A horse is hitched to the front, and you drive easily away to wherever your fancy dictates. But let me enter a word of warning—stick to a fairly

level road. On a hill, the toboggan is likely to take it into its head to beat out the horse, and very often succeeds. The result may readily become a serious mixup.

The toboggan, apart from its coasting talents, is employed quite extensively in the manner which the Indian used it, and continues to hold its own as a moving van. The interest in winter, together with the general popularity of camping, has given impetus to outdoor living in winter as well as summer. Outdoor people have discovered that with a good heat-reflecting tent and the right kind of camping equipment they can spend a warm and thoroughly enjoyable vacation in five feet of snow. Winter camping is fast gaining in popularity.

One of the most simple means of carrying camp equipment into the winter woods is that of strapping it to a toboggan. A man can haul, with fair degree of comfort, a toboggan load equal to his own weight, provided the snow is not so loose that it piles up in front of the hood. One simply loops the rope around one's waist and strides ahead. The addition of a canvas harness encircling the body just above the hips makes the pulling easier. If the load is especially heavy or the snow very loose, two men in separate traces can be harnessed in this way.

The toboggan used for wilderness travel is slightly different in construction from the type

usually found in hill coasting. Instead of being of uniform width the tail is slightly narrower than the front, and the widest dimension is rarely more than fourteen inches. Furthermore, the hood narrows as it turns upward.

This tapering of the hood is to prevent a smash when the toboggan comes into contact with a tree. The blow is likely to be only a glancing one. But, as a matter of fact, most any hill-coasting toboggan will serve well enough for an ordinary winter camping trip. It should, however, be of short length and as light as possible.

A toboggan loaded with camp equipment is liable to upsets, and care must be taken to see that everything is securely tied down. Pack the equipment much as you would a canoe — the heavier articles on the bottom and the lighter ones, such as blankets and clothing, on top. See that the load is kept fairly low. No parts of it should extend beyond the sides of the toboggan. A canvas cover is drawn over the whole load, and it is then lashed securely down by running a long rope back and forth in a diagonal direction between the side rails. Further suggestions regarding winter camping equipment will be found in Chapter IX.

The dog team hitched to a toboggan is a familiar sight to any one who has visited the North country in winter. I do not mean the half wolf, savage "huskies" which you read about in Jack London

stories. I refer to the ordinary household pet dog. Teams of this sort are used quite extensively. Attached to toboggan or sled they haul out the winter supplies, haul in the winter wood. They are collies, mastiffs, Newfoundlands, and of various other breeds.

Dillon Wallace remarked, in speaking about a dog team of "huskies," "At least a year's experience is necessary to enable a white man to handle a dog team." This remark might apply with almost equal force to the team of domestic dogs. When five or six dogs of highly strung temperaments are told to work together, there is likely to be trouble unless there is a master hand around to handle them.

For the average venturer into the snow-buried winter woods, a dog team attached to the toboggan is hardly practicable. But a single dog of muscle, good health and willing spirit, is wholly so. If the load is extra heavy, master and dog can pull together, the man at the end of a long rope in front. When the going is easy the dog can pull alone.

If the experience is wholly new to the dog it will probably be at sea for a time and turn the toboggan over a few times. But after a while all goes well, for the master walks ahead on snowshoes and tramps down a considerable trail, the dog follows its master, and the toboggan follows the dog.

CHAPTER VII

WINTER MOUNTAINEERING

ONE need not confine one's enjoyment of snow and ice sports to foothills and lowlands. Mountaineering, long an annual summer habit, has within recent years become a winter habit as well.

There are, indeed, quite a few outdoor folk who emphatically testify that if it came to a choice between climbing mountains in summer and climbing in winter they would have no hesitancy in choosing the snow season. More than a few members of the Appalachian Mountain Club, Green Mountain Club, Dartmouth Outing Club, and kindred organizations give active testimony to this effect.

Every winter, sure as snow flies, nearly two hundred members of the Appalachian Club with knapsacks, skis, snowshoes, ice axes, and ice-creepers get together for a two weeks' mountaineering vacation in the White Mountains of New Hampshire. Along toward March each year the Dartmouth Outing Club goes in for a four-day climbing expedition among White Mountain peaks. These have both been annual events for some years past. More recently, the Green Mountain Club organized a mid-winter climbing trip in the Green Moun-

tains of Vermont, which has become another annual club affair.

The Colorado Mountain Club of Denver holds two regularly scheduled trips each winter in the Rockies, one of these a snowshoe climb to the top of Mount Evans, 14,260 feet high. The Mountaineers, a large Seattle climbing club, go on an annual five day mid-winter pilgrimage, usually up Mount Rainier, while the Sierra Club of San Francisco, in common with the Mountaineers, has no snow in its own city streets but manages to find and take advantage of plenty in the mountains close by.

Various organized club trips are not all. Small parties of two and three from almost anywhere have a way of dropping in upon various winter mountain worlds at odd moments for a week or so of climbing. I know a New Bedford lawyer, for example, who toward the end of each January complains that his brief-smothered imagination is in need of a complete housecleaning. So he packs his knapsack, shoulders a pair of snowshoes, and heads for the White Mountains.

I have a broker friend whose ticker-strangled imagination gasps for a similar airing at about the same time. He wants to go out and climb a mountain. And he does. These men are fairly indicative of the growing popularity of winter climbing in the White Mountains and elsewhere.

This winter climbing is a vastly different matter from summer climbing. If you have clambered up New England peaks on a balmy summer day you are familiar with the fine system of trails and mountain-top huts which have been constructed by the Appalachian Mountain Club in the White Mountains. Thanks to the hospitality of these huts it is possible in the summer time for the wayfarer to mount from valley to sky-land without being weighted down with a heavy pack. The huts provide food, bed, and shelter. In the Green Mountains, the Green Mountain Club maintains an excellent system of trails running almost the entire length of the State, although not so many huts as the A. M. C.

These trails in both mountain ranges constitute one of the numerous essential differences between summer and winter climbing. In July, they are well trodden and clearly marked. One always knows exactly where he is going. Winter, however, is no respecter either of man or his handiwork and a trail buried under six feet of snow looks very different from the same trail in summer. There might just about as well be no trail at all. Even the trail markers are oftentimes out of sight, far under the snow. These same conditions, of course, may be equally applicable to other mountain ranges beside those of New England.

An occasional tree blaze above the snow drifts

Courtesy of "Outing."

OFF FOR A CLIMB. THE MAN WEARS A LEATHER JACKET; THE WOMAN, A SHORT-LENGTH PARKA.

is some manner of help, and if the weather is clear, the open white spaces disclosed by leafless trees is an advantage, but at the best it is a more difficult matter to keep one's direction in winter than it is in summer. One may lose sense of direction with special ease when faced with a confusing combination of wind and snow. With head bowed, fighting a high wind, the natural tendency is to swing off to one side.

I emphasize these facts merely to place the prospective winter climber on his guard. One of the prime requisites of the winter climber is the capacity for following a trail which to all intents does not exist. A previous knowledge of the snow-buried summer trails is a distinct advantage, but even so, compass and maps are indispensable.

Government topographical maps of any mountain region can be easily procured. So far as the White Mountains are concerned there are, in addition to these, excellent maps published both by the Appalachian Mountain Club and the Forest Service. And anyone who climbs in the White Mountains will find a distinct help in the form of the guide book published by the Appalachian Club.

In regard to the Appalachian Club huts just mentioned, I might add that the particular hut used mostly by winter climbers who stay overnight in the White Mountain peaks is the one near

the top of Mount Madison. During the winter there are no blankets or provisions kept in this hut, but one finds a stove, cooking utensils, and bunks. One must carry blankets and food in his pack. Likewise, before emerging above timber line it is a wise plan to gather a stock of fire wood.

This hut is something more than a half day's climb above the valley. The climb from the Madison hut along the Presidential range to the summit of Mount Washington is about as thrilling and exhilarating a winter experience as you will find in all the world. But don't try it unless you are reasonably certain of side-stepping a blizzard and be sure that the man who leads the way has done it before.

Winter climbing in the White Mountains, or any other mountains of equal magnitude, is always a husky undertaking. It is hardly ever without difficulties and in this fact likely lies much of its fascination. Your muscles, lungs, imagination, and brain are working every minute. When you win a peak, you have well earned it.

Winter climbing may also be dangerous. But not necessarily so. The whole story of safety and enjoyment in this vigorous sport can be summed up as follows: adequate preparation, wise conservation of energy, and good judgment. Indeed, the clause "good judgment" probably covers the whole subject. But in any case it may be said that

practically all mountain tragedies and most climbing discomfort may be traced directly to inadequate equipment, physical exhaustion, or losing one's head in a crisis—not infrequently a combination of all three. And all of these causes can be averted.

So, mental attitude and physical equipment are perhaps equally important. One thing to keep constantly in mind is that a mountain must be treated at all times with the most profound respect. It is a thing of moods; and when the mood happens to be friendly, everything goes along smoothly. But in the turn of a hand the mood may change completely and become tearingly vicious. When you go climbing in the mountains, you should go prepared for the worst; and when the worst comes, accept it all as a part of the day's work. If you don't, you are likely to get hurt.

The extreme changeability of weather conditions on the top of Mount Washington is a good example of the sort of situation which a climber must always be prepared to meet in the White Mountains. It is not an uncommon experience for one to step upon the peak of Washington on a midwinter day to find the sun shining brilliantly and barely the flicker of a gentle breeze.

Yet before night falls, the gentle breeze may develop into a hundred mile an hour gale and a blinding blizzard. It is a matter of record that on

the summit of Mount Washington the wind has been known to blow at the rate of one hundred and eighty miles an hour, accompanied by a temperature of forty degrees below zero. Of course there are lower temperature records, but this combination of wind and low temperature probably represents the most severe weather conditions that can possibly exist.

During a February blizzard on Mount Monadnock, New Hampshire, there not long ago occurred an especially lamentable tragedy, concerning which I will briefly give a few particulars. Two friends started up the mountain on snowshoes. The day was so warm that they did not even wear gloves. Well along in the afternoon they reached the top, rested and then started the descent. Presently, dusk began to fall, a howling wind sprang up and the temperature dropped toward zero. Then came a heavy snowstorm in which the friends lost their way.

A few hours later one of the men fell unconscious from cold and exhaustion. His friend worked over him for several hours but in the early morning he died. Later on, a searching party found the two friends, one dead, the other severely frozen and all but helpless.

When we hear of a tragedy of this sort we are likely to remember it the next time we go to the mountains. There are numerous peaks in the

White Mountains which one can both ascend and descend in a single day. Suppose that one is stopping at a hotel in the valley and wishes to make this single day round trip up and back but does not care about carrying the extra weight represented by emergency food and blankets in case he is caught out over night. Would he be foolish to take a chance and leave the emergency stuff behind? This is a very usual problem and question. The solution largely depends upon the size and difficulties of the mountain, the weather, and one's knowledge of climbing.

I have a number of friends who take this chance time and again. They have never been caught in a bad fix. But they know how to climb and they know the mountains like a book. Numerous times I have done the foolhardy trick of climbing a winter mountain alone. But there is always the chance. If one wishes to play absolutely safe he should always carry in his pack a good supply of blankets and three days' supply of food. It sometimes takes only half a day to climb a mountain but three days to get down again.

We will suppose that two men start up a mountain under the following handicap: it is new territory to them and they are not any too sure of the way to the top. The sun is shining brightly at the start, but three hours later they find themselves in a blizzard. They probably get lost. There's no

great harm in that provided they are equipped to stay out over night and that they keep their heads. The back tracks are probably covered by snow, so that avenue of escape is closed. If none other is open, there is only one thing to do; camp out and wait for things to clear up, bend to the mood of the mountain until it changes.

They pick out a sheltered cove in the pines or rocks, keep a blazing fire going, and wait. And let us hope that they do not select one of those inviting holes in the rocks which the prevailing wind has kept bare of all snow. For the prevailing wind will continue to explode its buffets on that spot. The wind is the reason the hole is there.

The process of losing one's head after getting lost under such conditions usually takes the form of floundering around in a panic, getting weaker and weaker from aimless expenditure of energy, and then dropping from exhaustion.

The situation of a fair-sized party headed by a competent leader who knows the mountains thoroughly perhaps alters the case so far as emergency blankets and provisions are concerned. These are hardly necessary. To some extent, there is safety in numbers as well as in expert leadership. Most of the winter climbing in the White Mountains is done by parties which may range in number from five to fifty. Occasionally, a climber

goes alone, but this is foolhardy. If one were to sprain an ankle or break a leg under such conditions he would be in a bad fix.

Snowshoes are the favorite and best form of foot equipment used in this winter climbing. The party walks in single file. The two or three at the head of the procession take care not to walk directly in each other's tracks. This gives a smooth, easily trodden trail for those who follow.

Now and again short rests are called, for snowshoeing up a mountain is puffing work. The man who brings up the rear of the procession as well as the leader is an expert climber and if anyone straggles behind from weariness or has snowshoe trouble the rear man sounds a halt signal.

Before mounting many feet upward one realizes the importance of having the right kind of snowshoes. The best practical lesson of this sort I ever witnessed was on a climb I once took with a good-sized party to one of the higher peaks in the White Mountains. Decrepit, sagging, and uncomfortable snowshoes contributed more to numerous halts and misery than did any other factor.

A tailed snowshoe used for mountain climbing should not have very much tail. Long, rangy models are wholly out of place. Unless the slope is very gradual, one is likely to find that the "bear paw" type of snowshoe has distinct advantages. Among these is the ease with which it can be

strapped to one's back or even carried in a pack after the open stretches at the top of a mountain have been reached and the usefulness of snowshoes is temporarily suspended.

In Chapter V, I have gone into the subject of snowshoes in greater detail but a few words might be added as regards their use in connection with climbing. If you have been accustomed to the tailed type of snowshoe and then suddenly change to the "bear paw" you do not get along very well at first on this tailless model. The balance of the two types is entirely different. For this reason, it is wise to become accustomed to bear paws before attempting a mountain on them.

Whatever model of snowshoe you fancy, make sure that these are in perfect condition before the climb begins. If they are not, they are likely to make your life miserable before the day is over. And always poke in your pocket or pack some snowshoe repairing materials.

Fully as important as a good pair of snowshoes is a secure pair of ice-creepers. While climbing a mountain of any great size in winter it would, in many instances, be fairly suicidal to wear snowshoes all the way to the top. Vast slopes of hard crusted snow and rocky pinnacles of glassy ice are encountered. And this is where ice-creepers come in. I will say no more at the present moment concerning these valuable implements. A special

chapter is devoted to ice-creepers and I suggest that this be consulted in connection with the present chapter upon mountaineering.

Some winter climbers in the White Mountains carry ice axes in conjunction with wearing ice-creepers.

The axe is used both in the capacity of a staff and to cut steps in the ice and hard snow. Such an implement to some extent duplicates the work of ice-creepers so far as the gripping under foot is concerned; but its use as a staff is always a distinct help.

When crossing a slope, you dig the pointed end of the axe into the up side of the slope with each step and in this way the body is really supported on a tripod. To all intents, you have three legs. In soft snow, the ice axe is only an incumbrance.

Every climbing party should carry a rope. The need for the use of this may not arise, but the chances are that it will. Even though the day is bright and still, it is not at all unlikely that there will be two or three pairs of ice-creepers in the party that refuse to grip the snow and ice securely. In a rope line, the end men are usually tied with a bowline knot and those in between with a noose. In figuring out the length of a rope, bear in mind that about four and one-half feet is required for each waist loop and that there should be a stretch of about fifteen feet between each two men.

Winter climbing conditions in the White Mountains are in a number of respects similar to those found in the high Canadian Rockies and the Alps. The treacherous snow cornice is a case in point. There are not a great many of these in the White Mountains but the fact remains that they are there and must be guarded against.

A cornice is a mass of overhanging snow half suspended in the air beyond a ridge or peak. A bright sun or the weight of a man will sometimes cause one to break away, become an avalanche and rumble down to the depths below. The deceptive thing about a cornice is that a person does not always know it when he is standing on one, for the upper surface is usually flat and seems a part of the ridge or peak. But if the ridge is such that you can look straight down the slope on either side there is slight danger of stepping upon a cornice.

The danger of snow avalanches of various kinds must be given careful attention although the risk is not, as a rule, so great in mid-winter with everything frozen up tight as it is when the spring melting begins. The winter avalanche usually consists merely of a single layer of snow, whereas later on toward spring, an entire slope may be stripped clean.

A fairly slight snow slide, however, may prove disastrous, provided there is a dangerous drop at its lower end. Even a gentle slope which further

down suddenly becomes a precipice should be regarded with careful respect. Once one is well started, there is no stopping. Any slope which harbors a considerable amount of wind-driven snow should be treated gingerly.

While toiling upward on snowshoes from the valley to the mountain top you will probably peel down fairly well so far as clothing on the upper part of the body is concerned. But it is wise to keep the neck protected, otherwise tufts of loose snow have a tricky way of dropping from overhanging branches and slipping down your neck. A series of icy baths of this sort upon an overheated body is conducive to colds.

When you encounter the cold winds on top of the range you will need all the warm garments you have in your pack and if you have a windproof outer garment such as a parka you will find good use for this; likewise, for a cap which covers all the face but the eyes. More than half the story of proper equipment is the right kind of clothing.

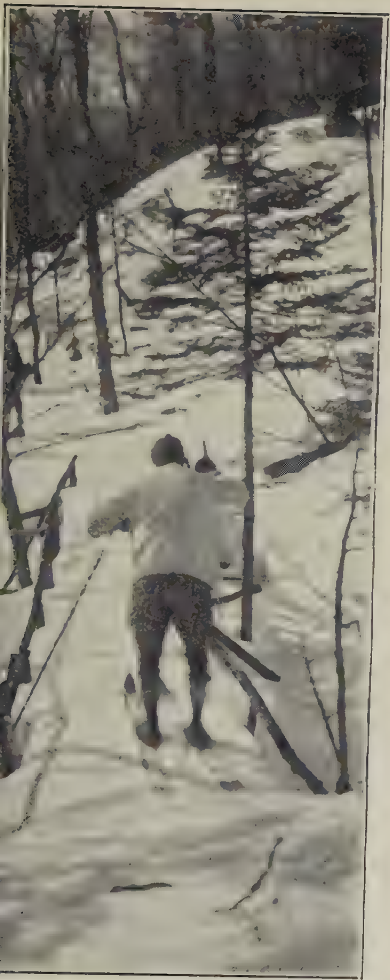
In mentioning various climbing implements I have made no mention of skis. If the present chapter were especially concerned with mountaineering as it is practised in Europe, this omission would be inexcusable, for skis have long played a prominent part there in climbing; snowshoes are seldom used. But I am writing mainly about mountaineering in our own country and here

the predominating implement is the snowshoe, although skis are now being used in climbing more than they were some time ago.

The snowshoe, I am inclined to believe, will continue to predominate as a climbing implement because the steep wooded slopes which are so characteristic of our mountains represent the special sphere of the snowshoe. It will take you through and to places that the ski will not. The sphere of the ski is open country. And when you are crossing ice-glazed mountain tops with ice-creepers, you are likely to find a long rangy pair of skis a rather unmannerly package to carry.

Anyone planning a mountaineering trip in a region such as the White Mountains should by all means take along a pair of skis for valley and lowland use. One hardly cares to climb a mountain every day. But unless one is exceptionally expert in the use of skis, all big scale climbing had best be left to snowshoes. And the art of walking on snowshoes can be learned in about an hour.

It is quite possible, to be sure, for an expert skier to ski up the Mount Washington carriage road and reach the highest point in New England. When Fred Harris was in Dartmouth he and two other members of the Dartmouth Outing Club pushed skis to the top of this six thousand two hundred and eighty foot mountain and then came



IN THE WHITE MOUNTAINS. TAKE ALONG A PAIR OF SKIS FOR VALLEY USE. ONE HARDLY CARES TO CLIMB A MOUNTAIN EVERY DAY.

down on skis. The following is what Mr. Harris says about the trip:

"The natives had told us it was too foolhardy a thing to attempt and the snowshoe men had jollied us a good deal about leaving us behind on the climb. Armed with ice-creepers, two hundred feet of rope, an axe, and extra clothing, we started up and were finally rewarded with a wonderful view from the summit. How to get down was an even bigger question. We roped ourselves together as far as the Half-Way House. From here down, we made a continuous slide of twenty-one thousand, one hundred and twenty feet in fourteen and a half minutes."

A drop of 2000 feet.

Such journeys and the use of skis in almost any mountain climbing in the White Mountains had best be left to the experts. In explanation of the rope used when mountaineering on skis it might be said that the customary method consists of roping three men together with a distance of at least seventy-five feet between each two. Either two or more than three people on a rope line tend to make it unmanageable.

In planning a winter trip to the mountains it is wise to take into account changing snow conditions and changing hours of daylight. The first snows of the year are light and fluffy, not conducive to especially good climbing; the hours of

daylight are short. Along toward the end of February, on the other hand, the snow is deep, firm, and solid. It has been accumulating with each storm during the winter and has gone through numerous cycles of thawing and freezing which makes it perfect for winter mountaineering. Furthermore, the hours of daylight are longer than they are in December.

CHAPTER VIII

WALKING ON ICE-CREEPERS

THERE are certain varieties of life-preservers which are worn in winter and under the soles of your feet. These are known as ice-creepers. They consist variously of metal cleats, spikes or caulks which crunch firmly into slippery sheets of ice or hard-crusted snow underfoot and thus prevent many a headlong tumble.

To one who goes a-foot in winter, ice-creepers perform somewhat the same sort of service which tire chains do for a motorist. They are invaluable in an emergency. You need them only now and then but when you do, the chances are that you need them badly.

Ice-creepers are a lightweight adaptation of the sometimes heavy *crampons* long used in Europe for mountain climbing. Almost any hardware and sporting goods store sells two or three different varieties of creepers. And you may be surprised by the number of different kinds of uses which are found for these.

Nice old ladies strap on a pair of creepers before venturing forth on the slippery sidewalk to mail a

letter down at the corner. Farmers wear them about their barnyards. Ice-fishermen use them a great deal. So do hunters, trappers, and mountain climbers. In fact, almost anyone who walks in winter across slippery surfaces can find good use for a pair of ice-creepers. The skier and snowshoer, of course, are included in this category for there invariably comes an icy slope when skis or snowshoes must be taken off and creepers substituted.

The various uses of ice-creepers can be divided into two general classifications. These might be known respectively as "light service" and "heavy service." Walking across frozen lakes and similar level stretches is what I mean by "light service." There is no great strain placed upon the creepers under such conditions and even though they do fail to grip the ice as they should, the chances are that no great harm is done.

Just as soon as you tackle a steep, icy slope, however, there is a great strain placed upon the creepers. This is "heavy service." There is nothing better warranted to throw one into a panic than to get halfway across such a slope and then feel the sensation of having one's creepers slip at every other step. Just one extra long slip, you realize, will be enough to set the ball a-rolling; and it's a long, hard road to the bottom. Good ice-creepers under these particular conditions are real

life insurance. An insecure pair is worse than none at all.

Let me review briefly the peculiar conditions found in the mountains during the winter and the reason for this will be plain. Take, for example, the White Mountains. With snowshoes on foot you slowly plod upward from the valley through the shelter of a friendly mountain forest. The snow underfoot is pleasantly soft and yielding.

Suddenly, you emerge above timber line. Here is a different mountain world, an open, bleak world. Some of the rocky pinnacles are quite bare of snow and in these spots the winter coat is one of glassy ice. A gale that sometimes blows at the rate of one hundred miles an hour has kept the snow moving. Much of it has found resting places in the more protected depressions of the steep slopes leading up to the pinnacles.

Here are long, rangy stretches of hard crusted snow which is almost as solid as ice. To set foot upon this crust with ordinary footgear or snowshoes would mean the start of a long whizzing flight, hundreds of feet down the side of the mountain. One method is that of chopping steps all the way with an ice axe and in extremely risky mountaineering, this is sometimes the best method. Step-chopping, however, is slow and laborious work. In average winter climbing in the White Mountains and elsewhere a far more simple way is

that of taking off snowshoes and strapping on ice-creepers.

I can assure you, however, that only once in your life will you tackle such slopes with creepers which fail to grip firmly and are incapable of standing a tremendous strain. The same lesson can be learned with almost equal force on the steep ice slopes of any hill country.

Under such conditions you are very often trusting your life to the ice-creepers underfoot. So, it is extremely wise to make sure beforehand that they are worthy of the trust. Failure to do so will be followed by a most uncomfortable afternoon, to say the very least.

Valuable comment relating to conditions of this sort is made by William J. Whiting in an article in *Outing*. Mr. Whiting says:

"If the climber has creepers which he can make stick, going up a 45° grade is reasonably easy, since the action is natural and the hands can be used to help the balance. Going down, on the contrary, is about as great muscular strain as can be endured, especially by a 200-pound man, for the reason that to make the spikes hold, his feet must be placed flat against the slope. This means that both knees must be bent all the time, which brings the entire strain of holding back on undeveloped muscles in the front of his thighs.

"After a few minutes it becomes impossible to go slow enough to keep control; so no one should

attempt to go down more than two or three rods of such a steep grade. The tendency to slip is increased by the necessity of striking the spikes of the lower foot in hard at each step and keeping the center of gravity over the feet requires the closest attention.

"Attempting to stop and have his picture taken under such circumstances makes the climber wish he had the equilibrium of a gyroscope—which he is apt to think he is and wish he wasn't if he loses control. Walking horizontally along the slope also requires fine balancing power, but is mainly an acid test of the effectiveness and comfort of the creepers.

"It may be interesting as a test of creepers to go up and down and across a 45° slope of hard, smooth ice, but no man in his senses would do it for recreation; a spiked pole against the ice will sometimes, not always, help balancing, but nothing will stop, or even slow a man up, if he once slips on ice as steep as that. He will reach the bottom at about the same speed as though he had dropped from the same elevation, and feel sure he is going faster.

"Where creepers are usually relied upon, however, the ice surface varies from level to a slope of not more than 30°, and often the ice is soft or the slope is just hardened snow."

It is quite obvious that the "light service" ice-creepers which are sold by almost any hardware or sporting equipment store may be suitable for walking on level ice but are wholly unsuitable for

icy slope conditions indicated by the foregoing comments. Creepers of the "heavy service" type are essential. Let us see what may constitute a serviceable creeping outfit.

The greatest variety of home-made ice-creepers I ever saw gathered together in one spot was on a winter climbing trip I once took with a crowd of fifty Dartmouth students in the White Mountains.

Some of these creepers were good and others not so good. The inventive ingenuity of the college student combined with the sinew of the village blacksmith had produced a number of quite extraordinary footgear contrivances. In several instances I found that the influence of the blacksmith had predominated. A heavy horseshoe arrangement with projecting spikes was quite a favorite. This was permanently nailed to the sole of a boot in much the same way that an iron shoe is nailed to a horse's hoof. This outfit gripped the ice with fair security but proved too heavy, cumbersome and tiring for comfort. Furthermore, it necessitated a complete change of boots when snowshoes were taken off.

Ice-creepers which are heavy labor under the same disadvantage as cumbersome *crampons*. It is possible to receive the same amount of security in a lighter outfit. A pair of heavy service ice-creepers should be reasonably light to wear or carry, easy to put on, and comfortably secure

every minute they are on. They should grip the ice firmly and allow you to walk up, down, or across a steep icy slope with fair amount of ease.

This security is possible only with spikes or caulks and these having from three-quarters of an inch to an inch of projection. There must not be too many of these or the snow will gather in between and they will refuse to bite the ice. With too few, however, the foot is likely to rotate upon the ice. The "balling" of snow between the caulks is something which must be watched while ice-creeping. When the caulks refuse to bite the ice, you are treading on dangerous ground. Keep them clear of caked snow. There should not be more than eight or nine caulks under each foot or else an uncomfortable amount of snow will cake there. Balling is most likely to occur when the snow is damp.

Your ice-creeping outfit should be inclusive enough to fit various kinds of winter boots. This may mean on one day a ski boot and on the next a snowshoe moccasin. It must be remembered, however, that the sole of the pliable moccasin is a pretty greasy, slippery proposition.

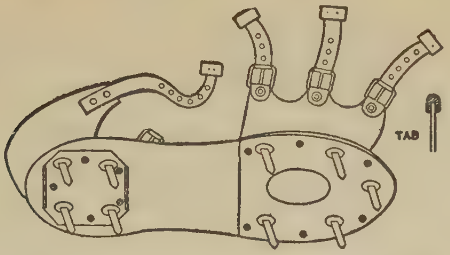
Almost any ice-creeper binding attached to this footgear has a tendency to slip and in cases where this fault is serious, you presently find the creepers on the side of your foot, instead of flat on the bottom where they belong. You must wear a bind-

ing in which this tendency is reduced to a minimum. The binding must be firm, yet at the same time not so firm that it restricts the circulation. Frost-bite may result from a binding which is buckled so tightly that it squeezes the feet.

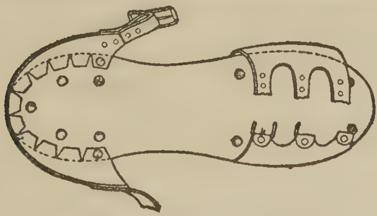
While taking a winter trip with members of the Appalachian Mountain Club some years ago I was initiated into the use of two patterns of ice-creepers for which I have a strong personal liking. These, both of the same general sort, were known among club members as types H and S. At that time, any one who wished a pair had to have them made to order. I understand, however, that these and similar creepers are now being sold by Boston outfitting firms.

The accompanying drawings give a fairly accurate idea of the construction of these creepers. The superstructure in each instance is a sole of heavy belt leather surmounted by a heel brace and cross-straps of welt leather. This leather superstructure bears a resemblance both to a girl's old fashioned skate and a sandal. Your moccasin or shoe fits into this harness and then the various straps are buckled. Ice gripping caulks are attached to the bottoms of the soles. In each variety of creeper there are caulks under both the heel and front part of the foot.

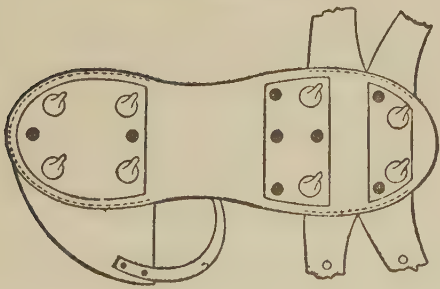
In H there are two plates of cold rolled steel about one-sixteenth of an inch thick, which are at-



TYPE H (PROSPECTIVE FROM UNDERNEATH).



TYPE H (FROM ABOVE)



TYPE S (BOTTOM).

tached respectively to the heel and forward part of the sole with copper rivets. There is a hole in the forward plate to lighten it as much as possible. The caulks, five of these forward and four under the heel, are firmly riveted to the plates.

The caulks may be either of iron or Bessemer steel. The points are case hardened and these project three-quarters of an inch below the plate. If the riveting shank of the caulk is squared to fit a square hole punched in the plate, so much the better, for this arrangement gives an especially firm purchase.

The specifications of type S are similar to those of H, except that there are only four caulks forward instead of five and there are two forward smaller plates instead of one large plate. This division of the plate into two parts sometimes has distinct advantages. It gives more play to the foot and the creepers are not so susceptible to balls of hard snow.

From my personal climbing experience I can recommend creepers which are constructed along the general principles indicated in the foregoing. These principles are fundamentally the same as those found in the *crampons* used for Alpine climbing, which to my way of thinking is a pretty fair test of security in itself. Yet, along comes William J. Whiting in an article in *Outing* and tells me that from the standpoint of holding power on hard ice the ideal creepers would be spiked stilts. He goes on to say that the climber is better off without either heel or toe spikes underfoot for they destroy natural walking on easy slopes and are usually in the way on steep ones.

It would be unfair of me wholly to disagree with Mr. Whiting for while I have tried creepers of the general type which he recommends (and found these wanting) I have never used creepers of the particular specifications which he describes. Mr. Whiting is a man of exceptionally wide and varied experience in winter climbing and anything which he has to say upon this subject deserves an attentive audience. Some day when I get around to it (as Heywood Broun would remark) I intend having a pair of creepers made according to his specifications.

The simplicity, lightness, and ease of attachment of this outfit commend it. The foundation of each creeper is a small steel plate about three by four inches in size with an open space in its center. Forged to the bottom near each respective corner is a spike. The plate fits under the instep of the foot. At either side are two tabs much like the heel and toe grips of a clamp skate. The binding consists of a single long strap which is looped across the upper part of the foot, connecting the tabs, criss-crossing and winding around the ankle.

Workable specifications for these creepers are given in the following extracts taken from the article referred to in *Outing*:

"The writer's present creepers were made to his specifications by a first class local blacksmith. They were made with the idea of having them light

yet absolutely trustworthy, and of using them with straps over either shoes, shoepacks, or moccasins. They have been used whenever creepers have been required during some eight years, and have always proved equal to the occasion even when, as once happened, they were in use for hours on the steeper side of Mt. Washington while a snowstorm quickly put several inches of snow over the smooth ice left by a March rain. The balling of damp snow is as serious a trouble as creepers can develop.

"The creepers as they are measure as follows: Weight of each creeper 7 oz., without strap; with strap, 9½ oz.; spikes ⅞″ long; front spikes (centers) 2″ from rear spikes, the spikes of each pair separated by 3″. The iron tabs are separated front from rear 1¾″ between centers and from those opposite, across the foot, by 4″.

"The slots in the tabs should be large enough for very strong straps and be smoothed carefully so as not to wear the straps or cut them. The upper edge of the slots are ¾″ above foot plate. One long strap is best as the criss-crossing keeps the creeper firm under strain from all directions, yet distributes any severe local stress to different parts of the foot. Eight years hasn't seemed to weaken the writer's straps any.

"Of course many kinds of harness can be used, but the iron tabs coming up beside the foot shouldn't be omitted; they give a solider support and security to the connection between shoe or moccasin and creeper than any other method, and make side hill work possible where otherwise the creeper would slide about under the foot from the strain. Consecutive hours of strenuous work both

with moccasins and with shoes have never caused any great foot weariness, nor have the straps, rightly placed, raised any difficulties with the temperature far below zero.

"As the result of varied experience with them the writer is convinced that his present creepers would be improved by having spikes 1″ long, measured from bottom of foot plate, and having the front pair of spikes forward ½″ farther, leaving the rear spikes in their present position just before the heel. That would separate the front from the rear spikes by 2½″ for a man wearing a shoe size 8 to 9.

"The spikes should have broad bases for strength, be forged in hot, and be tempered as hard as will not be brittle in intense cold. The smith should be cautioned against 'burning' the spikes; if burned they will crumble if a hard rock is struck and be generally untrustworthy.

"When the grade is steep, then if ever the climber needs the spikes close enough together to treat as one problem; not to have to be prepared for the various twists resulting from temporary contacts affecting his balance from different angles. If a man's foot is large enough some part of it will always be pushing or pulling him out of his precarious equilibrium. Spikes far apart are equivalent to big feet."

Whatever type of ice-creepers may be used, let me urge by way of conclusion that before venturing across mile-high mountain-top slopes, you first try your creepers out at home on reasonably low

and safe foothills. And while walking, place each foot in such a way that there is no chance of a stocking or clothing being caught by the spikes. There have been serious accidents through careless swinging of the spiked feet.

When you are climbing with ice-creepers, the foot is lifted somewhat higher than in the case of the normal walking swing. Any suggestion of a shuffle is risky. When the foot is planted, it is planted firmly in the exact position it will keep on the ice until the moment comes for another forward step. But the element which is perhaps most important of all is proper sense of balance.

CHAPTER IX

CAMPING IN THE SNOW

THE pleasure of winter camping is entirely dependent upon how you go about it and this means mainly, wise preliminary preparation. I do not wish to be responsible for starting anyone off upon the wrong track. Zero weather camping is a much more strenuous undertaking than that of summer days. Winter is no time to learn how to go camping for the first time. Unless one is in normal physical condition, has caught the spirit of the game in summer, and likes cold weather, he had best leave zero camping alone.

Provided one is suitably equipped and capable of taking care of himself in the cold out-of-doors, then winter camping automatically becomes a thoroughly feasible and wholly delightful experience. You can laugh to scorn the threatening downward course of the mercury in the thermometer.

Camping in the snow is the real fun of this winter camping. As in the case of mountaineering, snow camping is likely to be at its best in the late winter. In December and January, the hours of

daylight are all too short, there are great extremes in temperature, blizzards are not infrequent. February and March are the months when the accumulated snow in the woods is prime for snowshoeing and skiing, the days are longer, more inclined to smile with sunshine, and many of the nights are likely to be milder. I refer, of course, to average conditions found in a snow country.

I have said that winter camping is decidedly more strenuous than that of summer. You keep steadily busy exercising—chopping wood, skiing, snowshoeing, following fox and rabbit tracks. The invigorating air puts zest into you and you don't stand still very long. For this reason, there is a considerable part of time when one can get along with a comparatively small amount of clothing, provided this is of the right material.

But there should also be additional layers of clothing for rest periods and extreme changes of temperature. There is a notable difference between the comparative warmth of a friendly snow-laden forest and the chill penetrating north wind which blows across the bleak open stretch of a frozen lake. The ideal condition is to keep the body at its normal temperature. Take plenty of clothes but wear only as many of these as conditions warrant. All that has been said in Chapter I concerning clothing is especially applicable to winter camping.

In my first winter camping trip, I was very comfortably fixed so far as clothing was concerned. The point upon which I slipped up was blankets. Even so, had there been plenty of wood about to keep a blazing fire going all night I should probably have slept with perfect comfort. But one cannot always count upon wood. And in such cases, the only fire which can keep you warm is the natural heat of your own body.

The scientific reasons why a loosely woven or fluffy article of wool clothing is warmer than a tightly woven piece of wool are equally applicable to night covering. The principles indicated in Chapter I are so important that they will perhaps bear brief repetition. The unobstructed air spaces in the material serve two valuable purposes. One of these is retain the bodily heat and the other is to supply channels through which the bodily moisture escapes. In tightly woven material, on the other hand, all avenue of escape is closed to the bodily moisture. So, it soaks the blanket and when this happens, the heat holding qualities of the blanket noticeably diminish.

In the daytime, of course, with one moving about and exercising, the actual workings of this principle as regards clothing is not always noticeable. But at nighttime, with one lying still for long hours on the cold ground, its workings may become distressingly evident. During my first winter

camping experience I probably had plenty of wool blankets so far as total weight was concerned but they weren't the right kind. They were made of tightly woven material when they really should have been (and subsequently were) loosely woven.

It was not until the early morning hours that I became thoroughly chilled. The first hours of the night were quite comfortable. Since then I have met campers who complained of the same early morning discomfort, even in their summer camping. Invariably, they have held a drop in temperature as wholly responsible. Yet, a closely woven blanket becoming steadily filled with moisture as the night proceeds has had a great deal to do with this discomfort.

An important fact to remember is that one needs fully as much covering under as over one. A sleeping bag of the requisite number of blankets pinned or sewed into the shape of a sleeping bag and then confined within a canvas cover is a comfortable arrangement. If one sleeps out in the open without a tent, as is sometimes done, it is well to have a waterproofed canvas cover.

To some extent, such outer protection against the snow and wet is unhygienic. A waterproofed material is almost as unpermeable as rubber, with the result that the bodily moisture which escapes through the blankets comes up against a stone wall upon reaching the inner side of the canvas. The

ideal arrangement is that of having the canvas absorb the moisture. For this reason, when one is sleeping under the protection of a tent it is wise to have a canvas bag which has *not* been waterproofed and is hence capable of absorbing the moisture.

The amount of night covering required in a winter camping trip depends both upon the warmth holding capacities of your blankets and the condition of the weather. I have heard recently of a new kind of blanket knitted in such a way that the fibres stand perpendicular, just as does fur on the back of an animal. It is claimed that one or two of these blankets are sufficient for extremely cold weather. Although I have never seen one of these blankets I can believe that this might be true, for the principle is perfectly sound.

There are a few uncommon varieties of wool, such as that of the llama, which have better heat holding qualities than sheep's wool. But considering average loosely-woven sheep's wool and average winter conditions it may be said that one needs fully sixteen pounds of blankets. The weight of the canvas cover is not included in this estimate.

It is well to remember that there is more warmth in three blankets of fairly light weight than in a single blanket having a total weight of all three. Army blankets, it is well to remember, are built

more for durability than warmth. They are too tightly woven to prove satisfactory in very cold weather. Whatever blankets are used, make sure that they are long enough to reach up to your ears, so that cold draughts will be eliminated.

I have said a good deal about blankets for the reason that the blanket is the only type of night covering which the average winter camper is likely to find available. I have tried to indicate the necessity of choosing properly and in sufficient number when blankets are used. Yet there are varieties of night covering which weight against weight are considerably warmer than blankets.

One can sleep with perfect comfort in a caribou robe made into the form of a sleeping bag when the temperature dallies with zero. The weight of this bag is about ten pounds. With the same actual weight of blankets under those particular conditions, the average person would be chilled to the bones. Very nearly twenty pounds of blankets would be necessary to give the same comfort.

With this sort of bag, the same principles as regards warm air spaces are involved as in the case of blankets but more effectively. You sleep against the fur, the skin side being the outside of the bag. The warmth holding air spaces are not only in between the hairs but in each individual hair as well. For each of these hairs is hollow. The robe of either the caribou or reindeer is what

Arctic explorers sleep in around the suburbs of the North Pole. They almost never use blankets.

Sleeping bags made from the pelts of the wolf, fox, lynx, raccoon, and similar animals are very warm. An eiderdown robe, half an inch to an inch in thickness, also has remarkable heat holding qualities. Such a robe can be sewed into the shape of a sleeping bag and then confined within a canvas cover. The usefulness of most of these fur and down robes is confined to winter. They are entirely too warm to be of any practical use in average summer camping.

Snow may be soft but it is a mighty cold foundation upon which to lay one's bed. When you go winter camping you want a foundation which is both warm and cushiony and there is none better than that of balsam, pine, or hemlock boughs. There is a distinct advantage in clearing the campsite area of all snow, of getting down to solid earth. The snowshoes can be used as shovels. Then erect your tent, if you carry one, in this cleared space and lay a thick soft mat of pine boughs inside.

The clearing of a six-foot layer of snow such as is often found in the hills after the middle of winter is of course a rather formidable undertaking. There are various layers of hard crust to cut through and sometimes the job represents hours of toiling work. But on the whole, it is work well spent, especially so if one is to remain more than

one night in the same camp-site. You can get along, to be sure, by laying your bough bed on top of the snow but not so comfortably as by digging it out and getting down to hard pan.

The balsam, pine, hemlock or cedar branches which are to be your bed should be cut about a foot long and then laid on the ground in rows with an overlapping, shingling effect. The feathers ends of each row should cover the stubs of the next and so on for the length of the bed. The stubs should point downward. The thicker the bed, the softer and warmer it will be. The bough bed is another example of insulation, so important in body covering. When one sleeps in a tent, boughs should also be packed around the bottom of the tent to keep cold draughts from whistling through.

For a single night in the open, with weather conditions promising, I have come to look upon a tent as something of an unnecessary encumbrance. In summer time camping, the main advantages of a tent are that it keeps out rain and mosquitoes. In winter, there is slight likelihood of rain and certainly no chance of being pestered by mosquitoes. A snow storm is not nearly so uncomfortable as heavy torrents of rain. But if one plans to spend several nights in the winter woods, shelter becomes rather essential.

Only a few of dozens of different types of tents are suitable for winter camping. As a general

rule, the tents which have a sharp slope to the sides or roof are the best for the purpose. A flat roof holds snow and is likely to crash down or leak because of this load.

The famous Indian "wigwam" or "tepee" is in some respects the ideal winter camping tent. It is a cone-shaped tent with sharply sloping sides supported by a framework of numerous long poles which intersect at the top. The slope of the sides is so acute that only a minimum amount of snow clings to these. Of the various tents suitable for zero weather camping the tepee is the only one in which the camp-fire can be built inside the tent. The smoke curls upward and then out through a vent at the top; that is, it does when an Indian tends it. But in the hands of a white man it is more likely to smoke the occupants out of house and home. A small stove usually proves more practicable.

I find that W. Dunstin White, while a staunch advocate of the tepee for winter camping, feels much as I do about its natural heating limitations. In discussing the tepee, Mr. White makes the following interesting comment in *Outing:*

"The orthodox method of heating this kind of a tent is by an open fire in the middle. This is of necessity small and the smoke is supposed to drift upward and out at the smoke hole at the apex. Generally, however, it does not, and besides a fire

of sufficient dimensions to insure comfort at 30 below will occupy altogether too much floor space and requires altogether too much dry wood, for wet wood absolutely will not do.

"No. The open fire in the tepee is not practical in genuine winter weather. I wasted the best part of an otherwise good vacation and spent a whole lot of good breath in cussing before I came to this conclusion and adopted a camp stove.

"The idea of a circular stove in a circular tent struck my fancy and I got a cylindrical sheet-iron stove, without a bottom, the weight of which is very little. The wood has to be cut rather fine but the draft shuts tight and holds fire well. The little stove is convenient for preparing meals, but for extensive cooking I prefer the outdoor fire and reflecting baker."

When one has ample means of transportation for carrying camp equipment and plans to camp for a fairly long period in one spot, there is much to be said in favor of the common wall tent. All things considered, this is perhaps the most comfortable type of canvas shelter in existence. For its winter use, however, a sheet metal stove is needed and with this an asbestos stove ring and the proper amount of piping. I have heard of winter tents being lined either with paper or flannel as further protection against the cold.

When living in a wall tent, it is wise to protect the roof from falling snow and this can be accomplished by erecting a pole framework over the

tent, the framework being shingled with pine boughs which catch the snow. In this way, the canvas roof underneath is spared all onslaughts. The frame-work consists of a pair of poles erected

A POLE FRAMEWORK OVER A TENT.

SHINGLING THE FRAMEWORK WITH PINE BOUGHS.

at the front and rear ends of the tent in the shape of shears and connected by a single long pole running along the ridge of the tent some inches above the canvas. Eight or ten poles on either side of the tent with butt ends on the ground rest against

the roof pole. A framework of the same construction can be used over an A tent, a type of canvas shelter favored by some winter campers.

A canvas shed-like affair known as the "baker" tent is considered by some people the most satisfactory of all winter tents. Fresh air folk who like to keep warm before a blazing log fire are likely to be pleased with this outfit. The entire front is left open and the heat from the fire strikes the inside of the roof and is reflected down upon the occupants. The principle is that of the reflecting baker used in camp cooking. You become a human biscuit. It is a mistake to set up two baker tents facing each other both heated from the one fire. The result is a funnel which takes most of the heat upward.

A baker tent will keep you pretty busy hauling firewood and one should be careful not to build the fire too close or sparks may fly and do damage. Wind has a disagreeable way of shifting. Five or six feet away from the opening, is about the right distance under average conditions. When there is no snow, it sometimes pays to throw some water on the roof as a protection against sparks. A bough-shingled outer roof such as I have mentioned in connection with the wall tent and A tent can be constructed over the baker tent, although the manner of building this will be slightly different.

Each one of the four tents which I have named

GOING IN TO CAMP. A TOBOGGAN CARRIES THE EQUIPMENT AND THE DOG HELPS OUT (*see page* 101).

hotos by W. Dustin White; Courtesy of "Outing."

CAMPING IN THE SNOW. A STURDY WAY OF PITCHING A "BAKER" TENT AND PROTECTING THE ROOF.

looms rather big in bulk and weight for the man who carries all his camping belongings in the pack upon his back. If one feels the need of a tent and is forced to carry this upon his back, let it be a tiny, lightweight hiking tent which rolls into a small unobtrusive bundle and can be quickly set up or taken down. There is a tent of this sort I sometimes use which weighs only four pounds.

Excellent temporary shelter when no tent is carried can be had by gathering some poles and boughs and erecting an open front lean-to of the same general construction as that of the baker tent. In the Adirondacks one finds numerous permanent log lean-tos of this general type, these locally known as "linters." A linter, as a rule, is constructed of ten-inch spruce logs and has a floor space of about eight by ten feet. It is about eight feet high in front and four feet high in back. The front is open and out here is built the fire-place.

If you plan to use a tent during a winter camping trip in the snow, the color of the tent is a detail worthy of consideration, especially so when one lives under canvas for several days at a time. A dark colored tent is preferable to one which is white. The reason for this is perhaps obvious. One lives constantly in such a preponderance of white surroundings that the eyes demand a certain amount of rest. Furthermore, a dark tent is more easily seen a long distance off and this en-

ables one to make a straight line to it when returning to camp.

The matter of eyes in the snow country is one which should be given serious thought. One's eyes as well as body must be properly protected. There is an insidious, wicked affliction known as "snow blindness" which comes within the experience of all Arctic explorers and which is quite as likely to visit any one close at home who spends many continuous hours among white expanses of snow. Oddly enough, the dazzling glare of the snow on a bright sunny day does not seem to be directly responsible for snow blindness. It is more likely to come in hazy weather. Strain upon the eyes in trying to make out distant objects is evidently the direct cause.

The first symptom of this distressing and painful affliction is running at the nose, then the sufferer begins to see double and his vision becomes blurred. The eyes swell, water freely and then gradually close up. Snow blindness passes with proper treatment.

When Shackleton was in the Antarctic, all members of his party were sooner or later stricken with snow blindness. In the "Heart of the Antarctic" he mentions the difficulties of traveling over the snow and ice in bad light due to the fact that no shadows were cast on the dead white surface. As a result, when his party thought they were

marching along on a level surface they would suddenly step down two or three feet into depressions. The strain on the eyes under such conditions was very great and it was this strain which had much to do with producing snow blindness.

The treatment used by Shackleton was a drop of cocaine in the eye followed by the application of a powerful astringent such as sulphate of zinc in order to reduce the distended blood vessels. These medicines, however, are not likely to be always close at hand, so perhaps a more practicable treatment is that recommended by Horace Kephart. This consists of an application of cold wet cloths for half an hour three times a day, changing the cloths as they become warm. In addition to this, several times a day the eyelids are held open and a stream of cooled water which has been boiled, is poured in. At night, the lids and eyelashes are smeared with a pure salve to prevent them from gluing together.

Practically all chances of acquiring snow blindness are avoided if one minimizes the strain upon the eyes by wearing colored goggles a good part of the time when the eyes are undergoing strain. Amber is perhaps the most suitable color. The metal parts of the goggles should not be allowed to touch the skin. Wrap these in wool yarn or some similar material.

Frost-bite is another insidious cold weather af-

fliction which must be guarded against, although there is slight likelihood of such a visitation provided one is properly clothed. Frost-bite creeps upon one unawares, so be properly prepared both day and night. When sleeping, wear a warm cap pulled well down over your head. During the daytime, if you happen to see white spots on the face of your camping mate, act quickly, for this is frost-bite and the chances are that he himself is quite ignorant of its presence. Or, he may remark that his toes or fingers have lost all feeling. Ears, nose, toes and fingers are the parts of the body which are especially liable to frost-bite.

Frost-bite must be treated gently. Rough, vigorous rubbing may break the tissues. Rub first with a wool glove and then snow. One must bring the frozen part back *gradually* to its normal temperature. A sudden reaction is dangerous, so one would do best to remain out in the cold until the natural color is restored to the skin.

The camping equipment of the person who goes prepared to spend a week or two in the winter woods will, of course, differ in numerous particulars from that of the man who merely goes out for an overnight taste of winter magic. But it is possible for either of these campers to become lost in a blinding blizzard. At no time should either be without a compass. And if by any chance one does become lost, let him remember that the

most fatal thing in all the world is that of losing his head and running about blindly in all directions till he drops from exhaustion. The only safe way out is to sit down, carefully figure out where one wants to go and then leisurely proceed to go there.

A waterproof match-safe, a woods' knife, and as large an axe as can be conveniently carried are essentials of almost any winter camping trip. Be careful about using cold steel upon frozen wood. I learned my own lesson only after ruining a fine knife and breaking the blade of an axe. Before cutting or chopping, it is wise to heat the steel a little so that the cold is drawn from it. Wood is not always easy to find in a snow-buried country and for this reason it is sometimes an advantage to take along a small emergency supply of alcohol for cooking purposes.

Food for winter camping should be chosen both with regard to its heat producing and sustaining qualities and its capacity for being prepared with fair amount of ease. Foods which contain fats are the standbys and corn meal is excellent. One's diet of course should be varied. Meat which freezes in the frigid surroundings is no special disadvantage; in fact, this may easily become an advantage, as more than one summer time camper is willing to testify. The freezing of some foods, however, becomes a good deal of a nuisance and

one can to advantage be guided accordingly. Bread, for example, freezes in very cold weather; hardtack, on the other hand, does not freeze and for this reason may prove a worthy substitute.

Go properly clothed and properly equipped and then perhaps you will come back declaring that winter camping is the best of all. For real living there are few experiences comparable to that of living in the winter outdoors, twenty-four hours a day.

CHAPTER X

SNOW PHOTOGRAPHY

THE amateur photographer who fails to take advantage of the unique photographic possibilities of snow-time is missing some of the best pictures of all the year. It is within the sphere of snowscapes that the camera comes perhaps closest of all to making an accurate record of nature as she appears to the human eye and imagination.

Nature in snow-time is a study in gradations of black and white. Her cloak has become marvelously simplified since summer days, and the camera likes simplicity. To be sure, there are present some subtleties of color which cannot be reproduced in the finished photographic print, but these are surprisingly few. Black and white the camera can readily understand, and if given half a chance it will by no means overlook numerous gradations of gray which lie in between.

The whole stage is set in snow-time for truthful delineation in black-and-white print of nature as she really exists. Yet this does not mean that a snow picture is bound to be satisfactory. There are some amateurs who secure universally poor results. The knack of getting good snow pictures

is not always easy for the average amateur, for the reason that this is to some extent a specialized branch of photography. The snowscape camerist encounters a set of conditions which are quite different from those to which he has been accustomed in summer. It is essential that he change his methods to meet these new conditions. Practice, constant striving for better pictures, and the knowledge of a few semi-technical points demanded by snow photography will enable any amateur to make fast progress. One need not be an expert in order to get good snowscapes.

Many snow pictures are quite meaningless and without character. And of course one cannot hope to get worth-while pictures until he is willing to admit that a poor picture really is poor. The most common offender in this respect among photographic prints is the one which shows extreme contrast. I have heard this type of snow picture aptly termed "soot and whitewash." It shows an extremely black object against a very white background. All detail and fine gradations of tone which were visible to the human eye in that particular glimpse of nature are completely lacking in the finished photographic print. The snow is so devoid of character that it might just about as well be a white sheet strung on a clothes-line.

Such a picture, as a rule, fails in being a truthful delineation of nature, and for this reason is wholly

unworthy. There are, however, exceptions to this rule. It is sometimes possible for a "soot and whitewash" picture to have great merit. One of my own photographs which I prize most highly is that of a dark figure in a snowstorm. Almost no detail is shown and the falling snow is indistinguishable, but the first thing one senses upon viewing the picture is that, in reality, the snow is coming down fast and furious. It is the mere suggestion of the storm which is the making of the picture. Nature is there as she really exists.

The true record and spirit of a snowstorm are quite within the capabilities of a camera, and the result may be a peculiarly effective picture. Choose a day by preference when the falling flakes are large. Be sure that both the camera and the lens are fully protected from the snow. If it becomes necessary to change a film, make sure that no snowflakes flicker down upon this. Whenever practicable, in a snow-storm the camera should be given overhead protection which extends several feet beyond the front of the lens. Flakes which drop in close proximity to the lens are likely to show as blurred streaks in the finished print. An umbrella, crudely erected awning, open shed, or some similar overhead protection will place the snowflakes at a distance and hence within the area of clearer focus.

On a bright clear day it is oftentimes advisable

to make use of a ray filter. The ray filter is a colored glass which fits over the lens of the camera. It is comparable to the yellow goggles which have been such a comfort to your eyes at the seashore. You may recall that while wearing these goggles you have been able to see interesting details of a scene which without goggles the glaring sun would not permit you to see. The ray filter to some extent performs the same service in connection with the eye of the camera.

The use of a ray filter is not absolutely essential, but on a bright sunny day, at any rate, you can obtain noticeably better pictures with than without one. On gray days the difference is not so marked. The period of exposure given to the film should always be two or three times longer with a filter than under the same conditions without one.

Do not try to get a lot of territory within the confines of one picture. The direct foreground is usually the most important part of a snow picture and it is this which, as a rule, should predominate. You do, however, need something more than an uninterrupted white blanket of snow for your foreground. There should be present some element of contrast. Even a few dry stalks rising above the snow will give this and be the making of the picture. So will footprints in the snow or ski or snowshoe tracks.

It is fascinating sport to make photographic

records of the wanderings of Molly Cottontail, Bre'r Rabbit, Foxy Reynard, Old Man Coon and other sly denizens of the winter woods. Yet in taking pictures of the tracks left by these creatures, it is well to bear in mind the main fascination of a track to your own imagination; which is, its capacity for drawing you on and on to the unknown. The same sense of movement may be made to stand out in a picture if the tracks begin in the direct foreground, run the length of the picture and then vanish in the background; rarely so if the tracks run directly across the picture.

The best results in track photography are had when the sun shines. In taking track pictures or other winter subjects it not infrequently happens that some especially fine pictures are obtained by breaking a rule which some people consider one of the fundamental principles of photography; which is, that you must never point your camera toward the sun when taking a picture. As a matter of fact, you can get very fine snow photographs by pointing your camera in the direction of the sun. But in doing this it is important that the lens be shielded in some way from the direct rays of the sun and, so far as possible, from the reflected rays as well. To hold your cap above the lens as a shade is usually sufficient. Be sure, however, that part of the cap is not within the vision of the lens for if it is, it will appear in the finished print.

Just as a good snow-storm picture gives one the *feel* of the storm, so should a clear-weather photograph hold suggestion either of the grayness or brightness of the day. But the hours when the sun shines most brightly are not the best for getting the sense of brightness. More effective pictures can be obtained before mid-morning and after mid-afternoon than in the middle of the day. The long, rangy shadows cast across the white blanket of snow in early and late hours are oftentimes the very making of a picture. It must be remembered, however, that at such times the white bright light of midday has changed to one of soft yellowish tinge. This means that the period of exposure must be increased two or three times. From midday on, the intensity of the light gradually diminishes. After three o'clock in December, four o'clock in January and five o'clock in February and March, it diminishes with extreme rapidity.

The correct timing of exposure for a film or plate in winter is quite different from what it is in summer. The summer-season amateur taking up snow photography for the first time will have poor success unless he acquires a new set of exposure rules. Anyone wholly unfamiliar with light conditions can easily be fooled into thinking that there is more light on a bright winter day with the glare of the sun on the white snow than on an ordinary summer day.

The camera, however, cannot be fooled. It knows very well the difference between summer and winter light, knows that the matter is wholly one of light intensity. The light of summer is direct, while that from the snow in winter is reflected. And reflected light can never be as intense as direct light. Of course, one must not lose sight of the fact that the reflected light is present and that it counteracts to a fairly large degree the weak light of the season. A winter scene which is devoid of snow demands a considerably longer exposure than does the snowscape. Furthermore, a snowscape at mid-day with the sun shining brilliantly may take a remarkably short exposure. It is almost universally true, however, that an open snowscape demands a longer exposure than does an open summer landscape.

This matter of exposure is in some respects the most important element of all in taking snow pictures. It demands careful study. There are a number of general rules, of course, which are applicable both to summer and winter work, as, for example, the nearer a given object is to the camera, the longer the exposure. Even so, you are almost sure to make mistakes in timing unless during the early stages of your snowscape experiments you rely upon a good exposure meter. One of these can be purchased in any photographic store.

Even when guided by a reliable exposure meter

one would do wisely to make a certain amount of allowance for the physical changes which the mechanism of a camera goes through in winter. Cold weather contracts the metal parts. It oftentimes happens that a shutter works more slowly on a cold winter day than it does in summer. Indeed, there have been times with my own camera when the shutter has refused to function at all. I have been forced to go indoors and allow it to thaw out.

One may be easily fooled in winter time by the action of a camera's shutter and thus acquire a wholly erroneous idea of what constitutes correct exposure. Not infrequently, a shutter which is set to work at the speed of one-fiftieth of a second in reality works at a speed of about one-tenth of a second. Possibly the actual speed gives one a perfect picture while the supposed speed would have been far too fast and would have given poor results, but that is a case of pure luck. I do not say that a shutter invariably slows down. Sometimes it works perfectly. I merely give warning of its tendency.

In any case, if one needs to adjust one's shutter to one-fiftieth of a second in order to get an exposure of one-tenth, it is well to know this. With most shutters you can receive an approximate idea of the speed from the sound of the click. Indoors, a shutter usually works normally and for this reason you have a standard to go by; by clicking it at

various speeds indoors your ears become accustomed to the duration of these and then when you go outdoors you are able to distinguish any marked differences.

Attention to the physical changes to which a camera is subject in winter is an important element in getting good pictures. Only by knowing one's camera thoroughly, knowing what to expect under given conditions, can one make the proper amount of allowance for temporary shortcomings.

It is essential to know, for example, that when you take a camera from a heated house into the extreme cold of outdoors there almost invariably forms on the lens a cloudy coating of moisture. If a picture were taken under these conditions, the finished print would be an indistinguishable blur, which you would find it hard to account for unless you knew the reason.

After stepping outdoors in winter to take a picture, it is advisable to look at your lens to make sure that the moisture has cleared. It will do so after the glass has become acclimated to the cold. If the coating of moisture is slow in evaporating, you can speed matters along by wiping the lens with a clean linen handkerchief. But wipe very gently indeed, so that the glass will not be scratched.

Photographic plates and films should be carried in such a way that there is no possibility of getting

them wet. Small round tin containers sealed with strips of adhesive tape serve as waterproof protection for films. For the size of film known as 1A or smaller an empty shaving-stick tube does very well.

The lens of a camera should not be subject to extreme cold for a longer period than is necessary. Cold does the lens no good. Plates and films, so far as practicable, should be protected from continued extreme cold. If it is found possible to keep a set of plate-holders warmly wrapped in a blanket or some article of clothing before and after exposure, this care may prove an element in securing satisfactory pictures. It does plates no good to get them chilled. In any case, it is unwise to develop a plate or film immediately upon bringing it indoors. Before doing so allow the plate or film to become acclimated to the heat of the house.

Cold developing solutions are likely to give weak, flat negatives and for this reason the developing should be done in a fairly warm room. When developing snow pictures you will find it advisable to use a solution of moderate strength and to stop before the high lights become too dense.

Allow me to say a few words concerning snow photography at night. A snowscape on a moonlight night offers exceptional opportunities for fine pictures. For we can photograph whatever we

see with our own eyes, night as well as day. One can see a great deal on a moonlight night and so can the camera. But we must not allow the camera to gaze too long upon a night snowscape, for if it does the result will not be a night picture at all; it will look as though it had been taken in the daytime.

Much which has been said in the foregoing about daytime winter photography is, of course, equally applicable to night photography. The main difference is the length of exposure. Instead of working in terms of seconds or short fractions of a second as during the day, we work at night in terms of many long minutes. An exposure under average snowscape conditions is likely to range from fifteen to thirty minutes, depending upon the stop used and the nature of the surroundings. An exposure of more than thirty minutes is likely to give a day picture with all feeling of night lacking. I have obtained excellent results with an exposure of twenty minutes and the lens working at F-11.

If it so happens that while the lens is open during the period of exposure a vehicle carrying lights passes close by within vision of the lens, it is wise to close the shutter until the lights have gone by, otherwise, a streak may appear in the finished print. Permanent lights in the foreground such as street lamps are no great drawback provided the direct glare is not within the vision of the camera.

The camera can oftentimes be set up in such a position that the lights are hidden by trees or similar obstructions. The direct glare of lights in the far background does not matter. Indeed, the presence of these may sometimes add to the value of the picture.

CHAPTER XI

THE BUSY SPORT OF ICE FISHING

ICE fishing has been accused of being an inactive, stupid, unimaginative sport. Critics say that you don't do anything but stand around on the ice all day, half frozen to death, with eyes riveted on a little red flag at the edge of the fishing hole. Of course, it would be possible for this sport to deteriorate into an uncomfortable, unimaginative performance, but that would be folly indeed. Ice fishing, on the contrary, when enjoyed in the right spirit, is one of the most energetic sports I know about.

Properly to enjoy ice fishing one must not devote too much attention to fishing. I have a friend fond of skating who pretends to be much annoyed when the little red flag above the fishing hole signals the presence of a fish at the other end of the line. The ensuing excitement disrupts a fancy skating figure which he happens to be executing at that particular moment. But he knows how to get the most fun out of ice fishing.

Up in the frozen stillness of the Ramapo hills lies a rambling, forest-enclosed lake in the black

depths of which lurk numerous pickerel. To this, when the snow is deep on the slopes, we make an occasional fishing pilgrimage on ski or snowshoe. After we have hauled wood for a blazing fire, laboriously chopped a half dozen holes through twenty-inch-thick ice and set a line in each of these, we begin to be conscious of the fact that we have been keeping tolerably busy. By this time we are quite willing to hug the cheerful crackling fire for a few minutes and enjoy a snack of eats.

The white, snow-buried slopes close at hand smile coasting invitations which cannot be refused and we presently strap on skis once more. A round is made of the fishing holes to skim off the thin layers of ice that have formed on the water since setting out the lines, a parting survey is given of the tiny red flags above the holes to make sure that the bait in the black depths below is not being molested.

We wholly desert our fishing grounds for the time being, slowly climb the heights of the steep, white slope, but in doing so idly surmise which fishing hole it will be that will bring forth the first prize of the day. Presently, we choose our skiing course down the slope to the white floor of the lake and after a whizzing, thrilling coast are back again at the fishing holes.

Nothing, we find, has happened except that thin coats of ice have again formed over the holes.

These we skim off as one would the cream from the morning's milk, perhaps pull up two or three lines to see that the bait is still firmly planted on the hooks, and then turn our attention to coasting once more.

At the top of the first rise in our upward climb we turn for a final survey of the six little red flags waving against the white floor below. With sudden exuberant excitement we turn and speedily coast back. One of the red flags has dropped. We hurry to the hole, grasp a tugging line and a moment later a fine flashing pickerel is flapping helplessly in the snow.

When the fishing methods which I have indicated in the foregoing are used, the species of fish which are likely to show some manner of interest in a toothsome bait are as a rule, the pickerel, pike, pike perch and yellow perch. And as regards the northeastern part of the United States, the best month in which to fish for them is February. During December and January they are usually sluggish and refuse to take bait. Black bass will seldom touch bait, which is a fortunate situation all around, for this particular fish is almost universally protected by the law during the winter months. The smelt can be tempted and its peculiar method of being caught will be described further on in this chapter.

Ice fishing tackle is simple. All you need is a

hook, line, sinker and a "tip-up." I will describe this tip-up in some detail, for it is a device wholly peculiar to ice fishing. It is usually a wire apparatus attached to an upright wood support from which a line is suspended through the hole in the ice. The support is planted in a small slit cut in the ice at the edge of the hole. You can walk away and let the apparatus do its own fishing.

A tiny red flannel flag is usually attached to the tip-up and when there is the slightest pull on the line from the depths below, the red flag signals the fact by popping either up or down. This means that a fish is striking at the bait or has been hooked and you excitedly rush over to investigate.

There are various kinds of tip-ups and these as a rule are home-made affairs. A world full of amateur inventors devotes not a little attention to the subject of tip-ups, and some of the results involve springs which go off like mouse traps and perform other queer antics during the process of informing one that a fish is interested in the bait at the lower end of the line. A simple tip-up often proves quite as effective as the most involved.

Someone has discovered that a discarded umbrella offers one such possibility. A single rib pulled out from the umbrella is the part used. You can have as many tip-ups as the umbrella has ribs. The wood support part of the contrivance consists of a lath not quite so long as the rib,

Notch the lath at the top end and hang the rib in this groove by driving a rivet through the side of the notch and on through the center of the rib. You now have an arrangement which looks like the letter T.

At one end of the rib is tied the line and the small red signal flag. At the other end there is placed an adjustable weight, such as a perforated lead bullet. Ordinarily, the position of this weight is near the end of the rib, but when a bite is signaled, it slips down toward the tip.

A more simple tip-up, and one that can be made on the fishing grounds and tossed away later, is made by taking a stick about two or three feet long and tying the line on one end and the flag on the other. A second stick of equal length is laid across the hole as a support and the first stick rests on this, the line dropping into the center of the hole.

The two sticks are tied together at the point where they cross. The flag, of course, is lying on the ice back of the hole and when a fish in the depths strikes the bait, the flag shoots into the air.

One disadvantage of this type of tip-up is that the supporting stick underneath may freeze to the ice and thus refuse to revolve when the fish gives notice. This can be overcome by using a narrow, light board for the signalling stick. A hole is bored in this board just behind the line and the support-

ing stick is run through this. The board, of course, rests on its edge.

After one understands the duty which a tip-up is supposed to perform there is no difficulty in placing together some sort of simple device that will serve the purpose. Even the branch of a tree or some brush with the flag loosely looped over a flexible twig will do.

The fishing line used can be of the ordinary hand line variety of suitable strength and preferably braided. A twisted line in frozen surroundings is especially liable to kinks and there is nothing particularly joyous about unravelling kinks in zero weather. As to hooks, the No. 1-0 hook is usually suitable for pike and pickerel, and the No. 1 for yellow perch.

The best bait for winter fishing is the live minnow, ranging from two to four inches in length, the larger ones for pike and pickerel, the smaller for yellow perch. The common garden variety of angle worm is also good bait. Minnows to be sure are not always easy to capture in a frozen-over lake, but there are usually a number of enthusiastic ice fishermen living along the shore who always catch a supply of minnows in the Fall for their winter bait and keep these alive in a tub of running water. Or live minnows can be bought at some sporting goods stores.

If you are forced to catch your own supply of

minnows in winter, the best points to look for them are near the mouths of streams entering the lake and at the outlet. They also live around boat houses and piers. Very likely it will be necessary to dig a good-sized hole in the ice through which you can let down a net. Use cracker crumbs on the net as a lure.

The minnow cannot perform its duty as bait with thorough satisfaction unless it is placed properly on the hook. It must be hooked in such a way that it will neither get away nor die. If hooked through the spine or stomach, it will not live long; and if attached only by the skin, it will get away. The correct spot to place the hook is directly behind the top or dorsal fin.

If the ice happens to be two feet deep, as is often the case, the task of digging fishing holes represents husky work. Such varied tools as a crow-bar, axe, ice chisel, or carpenter's chisel, can be used for the purpose. Either a pronged ice chisel or a carpenter's three-inch tool with a long handle of wood or iron piping is perhaps the most suitable.

For thin ice, a hatchet can be used, but with a thickness of more than ten or twelve inches to overcome, any kind of axe represents hard labor. The ice chisel is better.

The fishing hole should be eighteen or twenty inches in diameter on the upper surface of the ice

and a few inches greater than this on the under surface. That is, the sides of the hole should slant outward, the reason being that when a fish is hauled out it strikes the slanting sides with only a glancing blow. A fish that meets head-on the under side of a jagged vertical wall stands a very fair chance of getting away.

The number of holes chopped depends upon the number of lines and tip-ups that are to be set. Either State or local laws may in some cases dictate a limit in this respect. In most parts of New York, for example, an ice fisherman is permitted to operate fifteen tip-ups at once but no more. Anyone out for a day's sport is content with three or four.

Fishing holes are usually chopped about sixty to seventy feet apart. Due consideration should be given to the location of such a series. It must be remembered that fish in winter seek deeper waters than in summer. The water should be at least eight or ten feet deep. A deep spot off the end of a point where the water is twenty-five or thirty feet deep is an especially promising ground for pickerel. If you know the lay of the land and water from having fished there in summer, so much the better.

After a hole has been chopped, soundings are taken for depth and then the bait is lowered to within fifteen or twenty inches of the bottom with

SOUNDING FOR DEPTH.

YOU REALLY DO CATCH FISH.

a sinker on the line which is just heavy enough to hold it there. You then toast your toes before a blazing fire either on the ice or on shore, ski, skate, or keep busy in other ways, with a weather eye on the little red flags, waiting for the signal that an interested fish in the black depths is striking the bait. And that is about all there is to the simple and energetic art of fishing through the ice when you go for pike, pickerel, pike perch or yellow perch.

If, however, you go fishing for the smelt, you will fish through a hole in the ice, to be sure, but your tackle and methods will be different in several particulars from those described so far. Smelt fishing is a unique application of rod and reel fishing.

Some people think of the smelt as being a salt water fish. This it is, but it is also found in a number of fresh water lakes, notably in Lake Champlain. Every winter when Lake Champlain freezes over, the ice fishers come out in great numbers and the following is the way in which they fish.

First of all, they believe in the solid comforts of home. They build a small shack about six feet square with a bench and a small stove inside, and place this on runners. Then they drag this across the ice to the spot where they plan to fish, dig a hole in the ice, pull the shack over the hole, open

a trap door in the floor of the shack and start fishing.

The tackle with which they fish consists of a fine silk line, a fairly heavy sinker, a pair of very small-sized hooks (usually No. 9 to No. 11) and the only kind of rod of its sort in existence. It is a combination rod and reel about ten inches long over all which has been whittled from a piece of wood of that length and about two inches wide. The original width of the first four inches remains and this serves as the reel but the last six inches are tapered down into the form of a rod. It is a "pocket rod" in the fullest sense of the word.

With the stove going comfortably in the shack, the ice fisherman sits on his bench over the hole in the ice and drops his line into the water. Sometimes he handles two rods at once, one in either hand. Lake Champlain is deep and it may be a matter of sixty-five or seventy feet before the sinker touches bottom. He raises the bait a few inches above the bottom and jiggles it. The bait may be either a small piece of liver or a piece of smelt skin baited to look like a minnow.

The operation of handling this tackle demands a considerable amount of skill, for the smelt bites very gingerly and if the line is slacked at all while being hauled in, the fish is lost. A novice at the game is likely to lose a greater number of fish than he brings out of the water. The smelt is not so

large a finney as the fish which are caught by means of tip-ups but so far as the demand for skill goes it might be called rather more of a sporting proposition.

There is still another type of ice fishing, favored by aborigines but not so much so by white men. It consists of dangling a lure in the water a short distance below the surface, holding a spear in the other hand then quickly spearing the fish when it comes to the lure. But most of us would hardly call that fishing.

CHAPTER XII

ICE BOAT SAILING

THE ice boat is a mysterious, almost uncanny craft, this spider-like noiseless skeleton of sail, planks and metal which the moment before getting under way lies so sleepily motionless. Yet, when given a slight prod, it awakes with weird lack of effort, becomes a flash of speed and then a tiny speck on the horizon.

The ice boat is the speediest wind-propelled craft in existence. On short spurts and under proper sailing conditions, it is capable of making at least sixty miles an hour. The extraordinary speed possibilities of the ice boat are not always evident in official racing records for the reason that the maximum amount of speed is made only during spurts. It is quite probable that ice boats have traveled for short distances at the rate of more than ninety miles an hour, although no records have been taken of these spurts.

The handling of an ice boat is at times a rather ticklish piece of work. For any person to attempt this without first having learned how to sail under

actual sailing conditions from an experienced ice-boater would be folly. Even an expert water sailor may easily get into difficulties unless he knows the various particulars in which water sailing and ice sailing differ.

Let us consider in this connection the common practice in ordinary water sailing called "sailing free" or before the wind. Under such conditions on the water, the boom, of course, is far out from the side of the boat with the sail almost at right angles to the direction of the wind.

If an ice boat were to sail with the boom far out in this manner not a great deal of progress would be made and one might easily get into difficulties. For, whereas in water sailing the resistance of the water always holds back the progress of the boat, in ice sailing on the other hand, the resistance of the ice is almost negligible. An ice boat sailing free with the boom far out would go as fast as the wind but no faster. And with a puffy wind, the result may readily be imagined. Even in a strong steady wind the boat would refuse to hold its direction.

For which reason, the sails of an ice boat are always kept close-hauled both in going to leeward and windward. Furthermore, an ice boat seldom sails for any great distance in a straight line. In going to leeward as well as windward, it tacks.

In going to windward an ice boat can sail within

thirty degrees or two and two-thirds points, but under such conditions is not making much speed. The boat, as a rule, sails much further off the wind than this, for the resistance is so slight that in reaching a given spot it can more than make up in speed what is lost in pointing. The course usually taken in sailing to windward is sixty degrees or five and one-third points from the wind. The craft can be eased off by luffing and when one wishes to stop the boat, this is accomplished by waiting until momentum has ceased after heading into the wind, loosening the jib sheet and then turning the tiller at right angles to the wind. This turning of the tiller is the ice method of anchoring a boat.

The greatest possible speed in an ice boat is usually attained when sailing one hundred and twenty degrees or ten and two-thirds points from the wind. The greatest speed to leeward is one hundred and fifty degrees or thirteen and one-third points from the wind.

That which has been said in regard to the difference in resistance between water and ice is especially applicable to the rudder of an ice boat. From a comparative standpoint, the rudder of an ordinary sail boat works extremely hard, the reason being the resisting power of the water through which it is ploughing. The rudder of an ice boat, however, turns so easily that unless one fully real-

izes this fact beforehand, there is likely to be trouble. Too sharp a turn of the tiller will spin an ice boat around completely and probably fling everybody aboard across the ice.

In speaking of the resistance of ice as being almost negligible I refer of course to hard smooth ice. When you go skating and glide speedily from smooth ice into a stretch of shell or soft ice you know what happens; there develops a notable amount of resistance and unless you are careful you will be thrown off balance. These same conditions apply to ice boating. And combined with a knowledge of sailing there must be a knowledge of what might be termed "icemanship." The skipper must keep his eyes on the ice as well as on the wind.

The knack of crossing a wide crack in the ice while under sail is a situation which calls for keen icemanship. Some extraordinary jumps of this sort have been made by ice boats. Archibald Rogers while sailing the *Jack Frost* at high speed once cleared a crack twenty-one feet six inches wide, but this was exceptional. It is folly as a rule to attempt any crack which is wider than the length of a boat's side runner and only then if taken head-on and at a high rate of speed. However wide or narrow a crack may be, it must never be approached diagonally.

Ice boats, as regards construction and size, are

somewhat varied, although there is more or less uniformity in the design of framework. The skeleton-like body of an average boat assumes the general form of a large Grecian cross supported by two runners and a rudder. The cross-piece of this cross known as the "runner-plank" is a short distance forward of the halfway mark of the center timber, otherwise known as the "backbone" running the length of the craft. A boat carrying about two hundred and fifty square feet of sail will have a hull which is about thirty feet long and a runner-plank about sixteen and one-half feet long. The mast is fastened in the hull forward of the runner-plank.

Various types of rigging are used on ice boats. Both the cat rig and the lateen rig have proved successful on small craft but with the average ice boat the sloop rig is the one most commonly favored. Some years ago ice boats were built very large and carried tremendous expanses of sail but many of these turned out to be white elephants. Some boats being sailed today carry six hundred square feet of sail but those having from one hundred and fifty to three hundred and fifty square feet are as a rule more suitable both for racing purposes and all-around use.

For racing purposes, ice boats are classified by the amount of sail carried. The classification made

by H. Percy Ashley, a prominent designer, is commonly accepted. This is as follows:

Class A—600 square feet and over.		
" B—500-600 square feet.		
" C—450-500	"	"
" D—400-450	"	"
" E—350-400	"	"
" F—300-350	"	"
" G—250-300	"	"
" H—200-250	"	"
" I—150-200	"	"

A certain class of boat is likely to predominate in a given locality. Thus, in New Jersey ice-boating centers the greater number of the racing boats belong to class E, in Boston F and G are favorites, while in parts of the West it is not unusual to find boats of class A. When boats are given classifications other than those just tabulated, confusion can be eliminated by thinking of a certain craft in terms of its sail area.

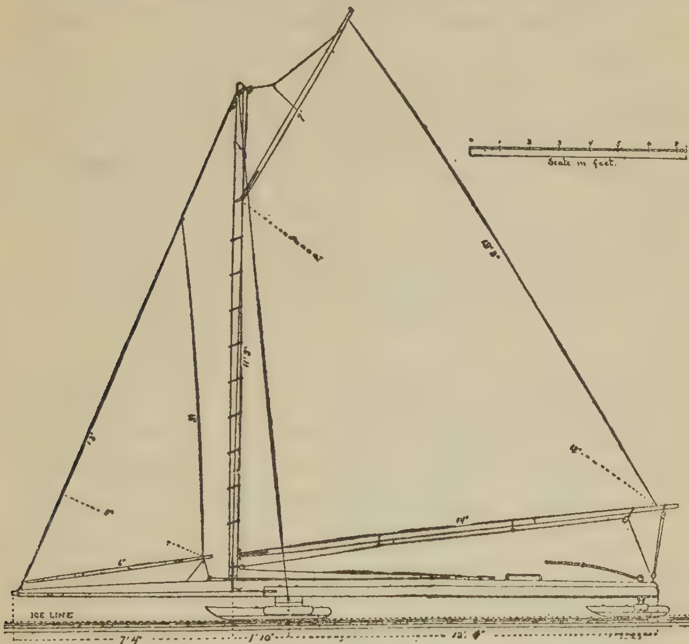
In the building of an ice boat purely for racing purposes, expense becomes no object. An up-to-date craft of this sort is likely to contain the following materials: spruce back bone, butternut runnerplank, oak flooring for cockpit, runners of quartered oak, runner shoes of soft cast iron, hollow spars, hoisting and standing rigging of galvanized steel with bronze turnbuckles, and steering gear of wrought Swedish iron.

Recently I told Captain Ashley that I would like to have working plans and specifications for an ice boat which could be built at a fraction of the cost of the ordinary expensive racing craft but which at the same time would be a thoroughly practicable, strong and speedy boat. After a study of his numerous designs we finally mutually agreed upon the 175 square foot sail area ice boat to which the remainder of this chapter will be devoted.

Both these working drawings and specifications of Captain Ashley's were published originally in *The Rudder* and it is through the courtesy of this publication that I am permitted to reprint them.

The construction of the 175 square foot ice boat to be described is simple. Starting from the extreme heel or stern of the boat a flooring is laid for the space of eight feet. This flooring can be increased to nine or ten feet if more room is required. To the runner-plank end are bolted the chocks or fore runner guides; in these the runners oscillate on a pin bolt. The rudder or steering runner also oscillates and is set in a crotch of malleable iron with a rudder post to which is fastened the tiller. The shrouds are secured to the runner-plank by eye bolts, in which can be inserted a turnbuckle. They can also be tightened by a rope lanyard if desired. The bowsprit shrouds should have turnbuckles or lanyards.

The materials and specifications of this ice boat follow. The accompanying drawings should be consulted in connection with these. Both the draw-



CAPTAIN ASHLEY'S GENERAL PLAN OF THE 175 SQUARE FOOT SAIL AREA ICE BOAT.

ings and specifications which follow are given just as they appeared originally in *The Rudder*.

Back Bone or Center Timber.—Spruce or pine; side timbers, spruce; runner plank, white wood; runners and chocks, quartered oak; runner shoes, soft cast iron; steering gear, malleable iron (Swed-

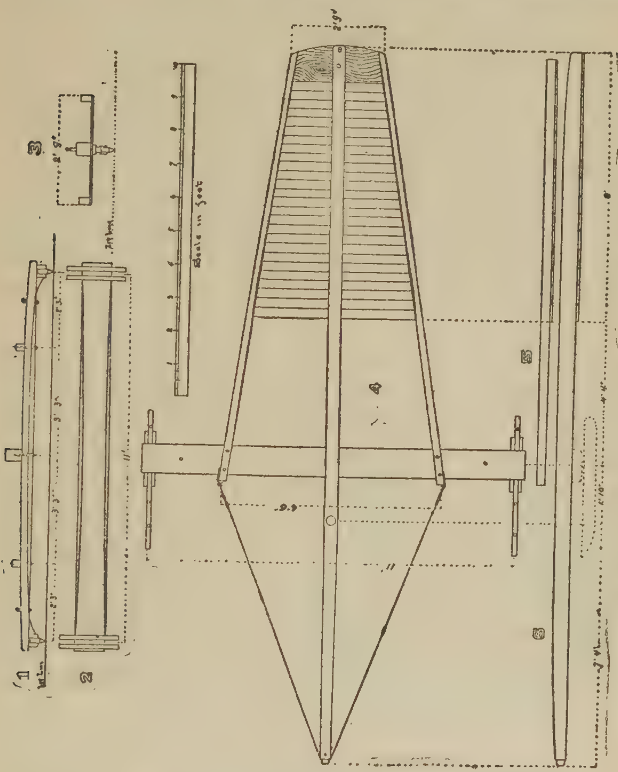
ish preferred); flooring, pine or spruce; spars, spruce.

Back Bone.—Figures 4 and 6. Straight grained well seasoned pine or spruce, length over all, 21 feet 6 inches. Width at center, 4 inches; at ends, $3\frac{1}{2}$ inches. Height at $\frac{3}{4}$ of its length, $5\frac{1}{4}$ inches; at extreme ends, 3 inches; at nose 3 inches and heel 4 inches. The nose is shaped into a shoulder to receive the loops of the steel rigging for bowsprit shrouds. Chamfer the upper edges of the back bone $\frac{1}{2}$ inch but the lower edge should be left perfectly square with the exception of a gradual taper of $\frac{1}{2}$ inch taken off from mast to nose. The latter running the full $\frac{1}{2}$ inch taken off to form the bowsprit.

Runner Plank.—Figures 1 and 2. Use tough-grained white wood with the heart of the wood on the upper side. The thickest part of the plank is at the center where contact with the back bone is made. The ends are worked down to a gradual curve to put spring into the plank for running over uneven ice. The two under edges are beveled, starting at nothing on the inside chocks and taking out about 1 inch in the center in an out curve. Plank is 11 feet 6 inches over all, $10\frac{3}{4}$ inches wide. Thickness at center, $3\frac{1}{2}$ to $3\frac{3}{4}$ inches, depending upon the density of the wood and at ends, $2\frac{3}{4}$ inches.

Side Bars.—Figures 4 and 5. Straight-grained well-seasoned spruce, 13 feet long, $3\frac{1}{8}$ inches thick and 2 inches wide. These dimensions are the same for the full length. Outside straddle of forward side bars, 6 feet 6 inches. Outside straddle of after side bars, 2 feet 5 inches.

Cockpit Flooring.—Figures 4 and 5. Tongue and groove pine or spruce, 6 inches wide with center bead, 5/8 inch thick. Screwed and glued to side timbers. At after end there is oak or ash board, 1



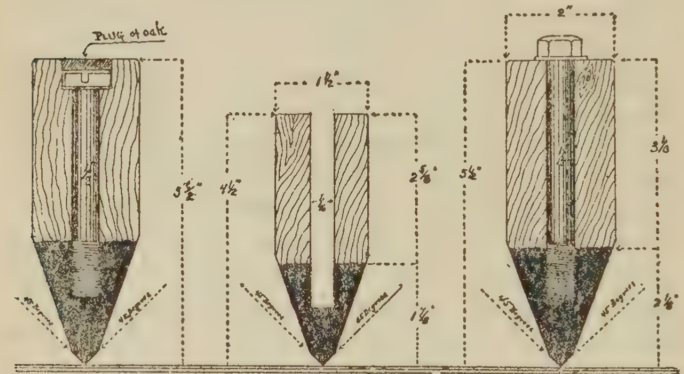
DETAILS OF THE BACKBONE AND COCKPIT ARRANGEMENT.

foot wide and 3/4 or 7/8 inch thick. This is the stern board and is placed to take the strain when the rudder is in use. The space on the upper side between this board and the side timbers is left open

providing space for your feet when lying in the cockpit and steering.

Runners.—Figures 9, 10, 13, 14, 15. All three runners are made of well-seasoned quartered oak of the best grade. The fore runners are 4 feet over all, 2 inches wide and $3\frac{1}{8}$ inches deep. The steering rudder is 2 feet 9 inches long, $1\frac{1}{2}$ inches thick and $2\frac{5}{8}$ inches deep. This applies to wood only. Depth of cast iron shoe for fore runners is $2\frac{1}{8}$ inches, rudder shoe, $1\frac{7}{8}$ inches.

Runner Shoes.—Pure, soft cast iron capable of being filed to shape. These will harden up with usage. The fore shoe is secured by four hexagon



DETAILS OF THE WOOD AND IRON RUNNERS.

head bolts, $\frac{1}{2}$ inch in diameter. The third bolt should be counter-sunk into the runner and therefore must have a slot cut in the head. Use two hack saw blades side by side in order that slot will be wide enough. The cutting edge is a 45 degree

angle. Fore and aft curve of cutting edge, ⅛ inch. The rudder shoe is secured by three hex. head bolts, 7/16 inch in diameter and the shoe is 1⅞ inch deep. Fore and aft curvature, 1/16 inch. The riding bolts for the fore runners that pierce the chocks and runners are ½ inch diameter and that of the steering runner that passes through the jaws of the rudder post, 7/16 inch. Make the wood runners first and to this fit the casting pattern. It is advisable to have the pattern made at a foundry as they will allow in pattern for shrinkage. After casting is received, file to shape and clamp in wood runners and tap for bolts. After shoe is fastened you can do the final filing and cutting of edges. Finish with fine emery cloth wrapped over a flat file.

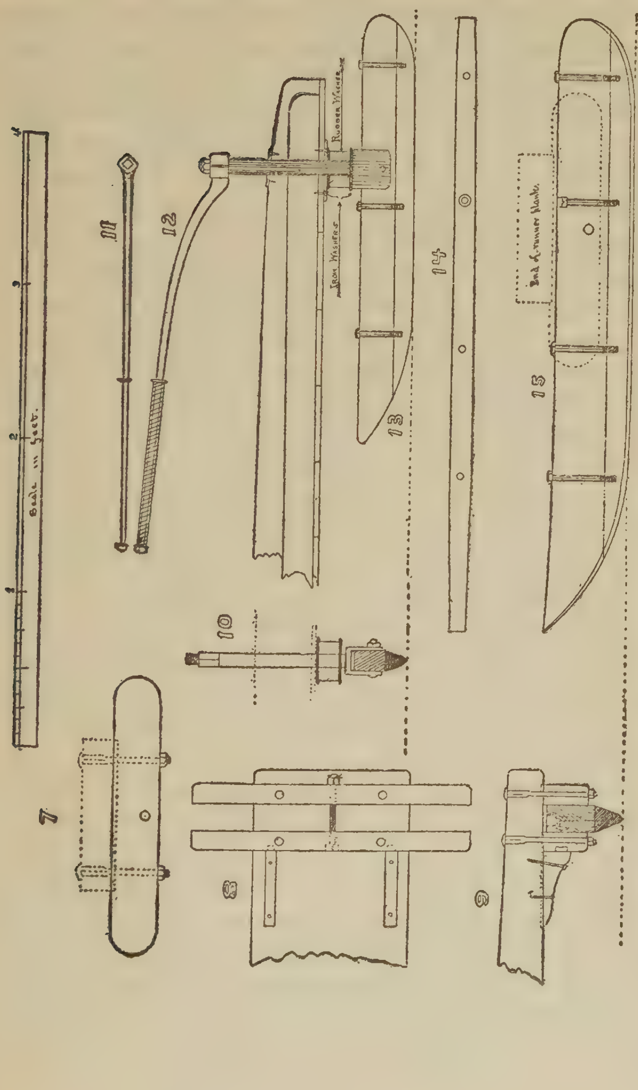
Runner Chocks and Guides.—Figures 7, 8, 9. Chocks are made of quartered oak and are sunk ⅛ inch in runner plank and glued. Held in place by four carriage bolts, 7/16 inch in diameter. The riding bolt upon which the runner oscillates is ½ inch diameter and has a square head sunk into the inner chock. The inside chocks each have two braces. Length of chock, 22 inches, depth 4⅛ inches, width 1¾ inches. The braces are sunk ⅛ inch into runner plank and rabbetted into inside chock. Glued and screwed into place, 6¼ inches long, 1 inch thick.

Spars.—Of straight-grained solid spruce. Mast, 16 feet 6 inches over all. Diameter at center 4½ inches; at upper end 3¼ inches; lower end 3⅞ inches. Boom, 14 feet 9 inches long; 3⅞ at center; 2½ at ends. Gaff, 3¼ at center; 2 inches at outboard end; 2½ at jaws, 7 feet 6 inches long.

Rigging—Halliards.—¼ inch diameter flexible steel long enough nearly to reach back bone when sails are hoisted. A thimble is spliced in the standing end to which a rope pennant is attached. The pennant is passed down through a cleat at foot of mast and then up and through the thimble and down again forming a simple but powerful tackle. It has the advantage of leaving no halliard coil in the way. Mast shrouds are galvanized steel yacht rigging, 7 strand, rope center ¼ inch diameter with a loop over the mast head. Set up with lanyards or ⅜ inch turnbuckle. Mast should be raked aft when the side shrouds are set up and the tightening of the jib stay will bring it plumb. Bowsprit shroud is same as main shrouds. Fore end has loop to fit over nose and turnbuckle at after end. Turnbuckle hooks into eye bolted to fore end of side bars. Jaws can be fitted on main boom as well as on gaff. In the plans a simple form of two eye bolts is shown instead of jaws at boom. Main sheet 7/16 inch diameter manila rope. Jib sheets 5/16 inch manila. Should you use hemp rope the size required will be ⅜ inch. Blocks should be bronze or wooden. Do not use galvanized blocks as they break in cold weather. Cleats of galvanized iron or made of locust or oak.

Sails.—To be of the dimensions shown on the plans.

Steering Gear.—Figures 10, 11, 12, consists of a rudder post 1 inch in diameter and 11 inches long from head of nut to jaws. Jaws are 3 inches deep and 3 inches wide and fit snugly over the wood of the steering runner. Tiller is 2 feet 8 inches long and is fitted with square head to fit over the rudder



PLANS OF RUNNERS, STEERING GEAR, ETC., DESCRIBED IN THE SPECIFICATIONS.

post. The handle of the tiller is served with 3/16 inch cotton line. Rudder post at lower end has two iron washers between which is a rubber washer $1\frac{1}{4}$ inches thick. This lessens vibration over rough ice. Rudder post also has a $\frac{1}{8}$ inch plate on upper side of back bone and lower side of flooring to form a bearing.

Iron Work.—Runner plank is secured to back bone with one $\frac{1}{2}$ inch lag bolt. Each side bar is secured to runner plank by two carriage bolts $\frac{1}{4}$ inch diameter. At the nose is fitted a U-iron or a 5/16 inch eye bolt can be used. On the runner plank for the shrouds are two 5/16 inch eye bolts located as shown. At the mast head is a $\frac{1}{4}$ inch U-iron or eye bolt for peak block. Throat block has a $\frac{1}{4}$ inch diameter spliced wire pennant. The lower end of the mast must have an iron band about 1 inch deep and 1/16 inch thick fastened with three screws. The mast can be stepped into a square iron plate with a square hole in it. The lower end of the mast must be squared off to fit this hole. Instead of the iron plate a block of oak can be used if necessary. The wooden block should have side rivets and the grain placed to run fore and aft.

General Suggestions.—Build your boat before cold weather sets in. Always paint or varnish the hull. The spars must be varnished with spar varnish. Look out for stones in the ice; always dig them out. Be sure to put a coating of castor oil on your runner shoes after the ice season. Store boat and equipment in a dry place. Put the sails in a bag and support it by a wire from a rafter so rats and mice cannot get to the cloth. A canvas

cover over the cockpit will save snow scraping. Always remove the sails at a sign of prolonged bad weather. When leaving the boat for the night place the boat on boxes or horses so the runners are off the ice about a foot. If you do not do this the runners will sink into the ice.

CHAPTER XIII

SCOOTERING

ON the Great South Bay of Long Island just a few years back there was born of necessity a strange amphibious craft known as the "scooter." Next to a hydroplane, the scooter functions more like a wild duck than any craft which I have ever seen. The reason why the scooter came into existence is as follows.

The rangy land-locked salt water lagoon which is the Great South Bay is in winter neither a free reach of open water nor is it solid ice. It is partly ice (very treacherous ice) and partly open water. Across the bay from the Long Island mainland are numerous outlying beaches with which communications must be kept up throughout the winter. These beaches on the ocean side are spotted with life-saving stations.

The treacherous intervening stretch between mainland and beaches cannot be walked on for any great distance, can seldom be crossed by sail boat and there is not a sufficient amount of good ice to permit much ice-boating. Until a few years ago the customary method of making the trip across consisted of mounting a boat on a sled, dragging

this across the ice as far as one dared walk, sliding the boat off into open water and trusting to luck that it would reach the other side. There were numerous drownings.

In due time the thought seems to have occurred to some unknown genius to attach the sled runners directly to the boat. Through process of evolution a sail was added presently and the hauled boat ceased to exist. The result was the amphibious scooter.

The scooter defies any strict classification. It may be called an ice boat in that it sails on ice but it is, of course, vastly different in construction from the skeleton-like craft which for nearly a century has been known as an ice boat. The scooter is equally at home on ice and open water and for this reason neither can it be called a sail boat. Its actions and rigging are unlike those of any craft which is strictly confined to water, although the scooter may be sailed in summer as well as winter.

In common with several implements of winter such as the snowshoe and ski which originally were regarded merely as a means of getting from one place to another, the scooter has entered the realm of sport. Scooter racing on the Great South Bay has become as permanent an institution as has ice boat racing in New Jersey and the Middle West. A scooter when sailing under favorable conditions can make about thirty miles an hour. And under

unfavorable conditions it can churn, bump, rumble and splash from hummocked ice to open water and then back on the ice again in a manner which brings to mind the well known story "there ain't no such animal."

An ice boat enthusiast sometimes regards a scooter in somewhat the same light which the owner of a Rolls Royce might a flivver. I recall watching a scooter race when a critical ice boat sailor suddenly exclaimed:

"'Just hear them will you. Listen to all that noise. Bumpity-bump-bump-bump. A regular train of cars. It makes me sick. Give me a smooth silent ice boat every time instead of those noisy contraptions."

The fact remains that no ice boat would have dared venture across the particular stretch of ice on which these scooters were sailing. Like the flivver on land, the scooter on ice and water will take you almost anywhere that you wish to go.

The scooter as you find it on the Great South Bay assumes numerous weird forms, an effect which is by no means lessened through the genius of the small boy. Even a watertight dry goods box has in more than one instance become a full-fledged scooter. There is, however, one type of craft which predominates, for it has been found through experience that a boat of the construction which I am about to describe sails better than all

others under the varied conditions to which a scooter is subject.

The hull of the typical scooter resembles fairly closely that of a duck boat. It is about fifteen feet long and four or five feet wide. The boat is well decked, fore, aft, and amidships, with room left for a cockpit having a strong coaming. Both the deck and the bottom are gently curved in much the manner of a turtle's back.

Only when the bottom of the scooter is visible do you see evidence of its ice sailing capacities. For bolted to the bottom are two runners either brass or steel, these about ten feet long and about twenty inches apart. The runners are slightly rocked somewhat after the manner of a rocker skate.

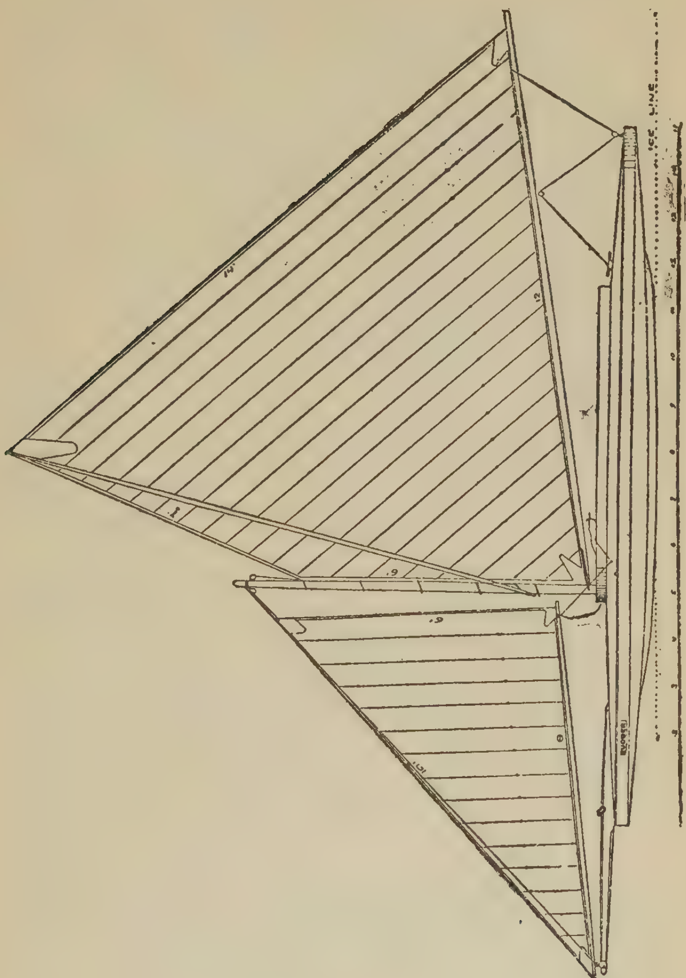
A modified jib and mainsail rig is used. Both astern and in the bow a considerable amount of lateral expanse of sail is needed. The reason for this is that the scooter carries no rudder. It is steered mainly through proper manipulation of the jib although combined with this may be the handling of the main-sheet and a change in the seating positions of the crew. A person sailing alone sits amidships holding the jib sheet in one hand, either hauling it in or paying it out, according to the course which he wishes to take. To head into the wind you pay out the jib sheet, to head off you haul in. Extra speed in coming into the wind is

had by shifting the weight forward, thus lightening the stern.

The mainsail of the scooter is kept trimmed fairly flat. You cannot sail before the wind as with an ordinary sail boat for the reason that the jib would become blanketed by the mainsail and the jib being the steering gear would thereby refuse to function. You have to tack when going to leeward as well as to windward. Just as an ice boat must approach a crack head-on, so must the scooter meet an open water head-on or else over she will go. In approaching a stretch of ice from the water, the same rule holds good. When the wind is not strong enough to carry the scooter up upon the ice a pike pole having a hoe attachment is used. A scooter almost invariably carries one of these poles and also a pair of oars.

Most of the scooters used on the Great South Bay are home-built affairs. Some are of fairly light construction and others of heavy construction. In view of the churning, bumping life which the scooter leads it will be seen that there are distinct advantages to the latter. Even the most serviceable and speedy scooter is a fairly inexpensive craft.

Through courtesy of The Rudder Publishing Company I am permitted to give the following specifications and the accompanying working drawings of a thoroughly serviceable scooter de-



CAPTAIN ASHLEY'S SAIL PLAN OF THE SCOOTER.

signed by H. Percy Ashley. The drawings, you will note, are numbered from 1 to 16. The following will serve as a key to these:

1—Side view of hull.
2—Showing timbers, etc.
3—Showing deck, deck beams, etc.
4—Deck with grating in cockpit.
5—Bottom and runners.
6—Section at fourth frame.
7—Midship section and runners.
8—Section at twelfth frame.
9—Details of runners. A. 9/16 inch iron screw head bolt. B. Oak runners. C. Screw fastening brass. D. Brass.
10—Side view of hoe pike.
11—Another view.
12—Steering pike. (Sometimes trailed astern to bring craft to desired course).
13—Steering pike, showing full length.
14—Hoe pike, showing full length.
15—Draw-pull screwed on deck for heel of bowsprit.
16—Manner of fastening bowsprit just aft of stem.

Captain Ashley says that in carrying out the specifications of this scooter all materials are to be of the first grade, the wood fully seasoned and free from knots or checks. The entire construction of

the hull is fastened with brass screws, not a nail being used, the only exception being the iron bolts that fasten the runners to the hull. The specifications which follow, as well as the accompanying drawings, are taken from The Rudder Company's publication, "How to Build an Ice Yacht."

Keel and Stem.—Shall be of white oak, the stem being of the usual form in a boat of this type. The keel or middle plank extends full length of the boat and is 3/4 of an inch thick, tapering to 1/2 inch at each edge to match with thickness of planking. Width of keel 3 3/4 inches.

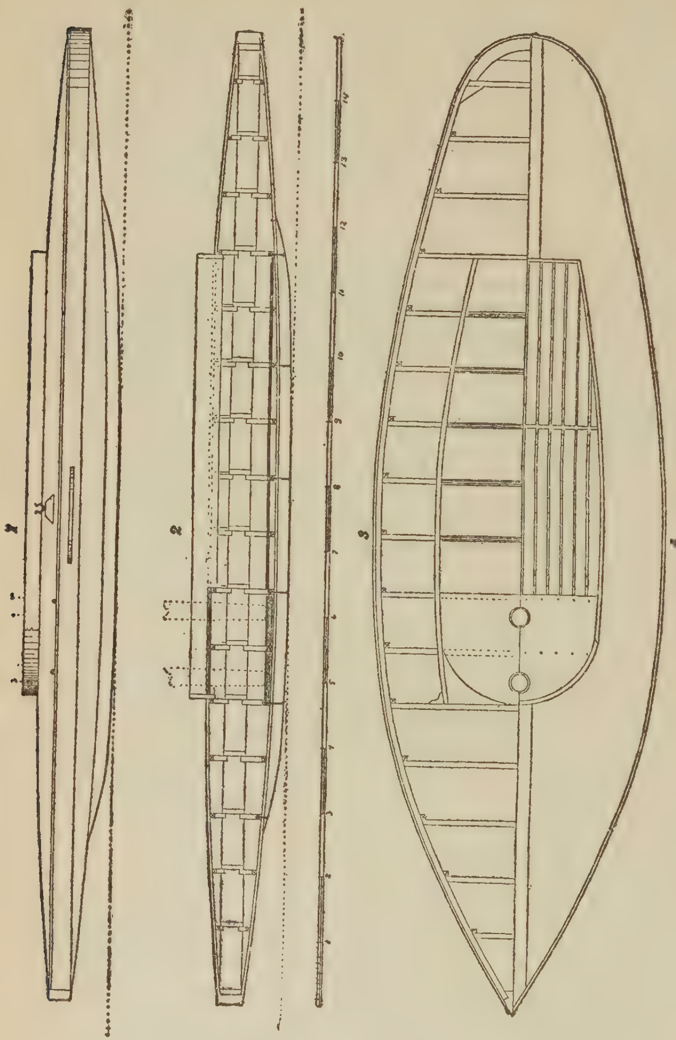
Frames and Deck Beams.—Are spaced 11 inches from center to center, and are of oak of the following dimensions: 1 1/4 inches by 1 1/4 inches; they are steamed and bent to shape; they are in one piece and extend to side board or wale. The deck beams are of the same dimensions as the frames. The two are fastened by an upright of 1/2-inch pine, that is fitted close to the side board; the breadth of the pine upright is 2 inches.

Planking for Hull and Deck.—Of selected white pine 1/2 inch thick and 4 inches wide, fastened with 1 1/4-inch brass screws. Decks laid parallel with the king plank.

King Plank.—Runs full length and is 1/2 inch thick and 3 1/2 inches wide.

Side Pieces or Wales.—Are each in one piece, extending full length of boat, and are 3 1/2 inches wide and 1/2 inch thick.

Cockpit Coaming.—Oak steamed and bent, as



THE HULL OF THE SCOOTER.

shown in plans, ¾ of an inch thick and 4 inches deep. The height above the deck is 2½ inches.

Finishing.—The wales, mast bench, king plank, cockpit coaming and stem to remain bright and be covered with two coats of varnish; hull two coats of white paint; the deck to be painted either straw or light olive color.

Sails, Rigging, Etc.—The knockabout rig is as follows: Mast 8 feet 6 inches by 3½ inches; boom 12 feet 6 inches, center 2¾ inches, tapering to 2 inches. Sprit 12 feet, center 2½ inches, ends 1¾ inches; jib boom 8 feet 6 inches, center 1½ inches, ends 1 inch. The bowsprit is 5 feet 6 inches long and 3 inches by 3 inches at largest part. The dimensions of the sails are as follows: Mainsail—hoist 6 feet, boom 12 feet, leech 14 feet, head 7 feet; jib on foot 8 feet; leech 6 feet, stay 10 feet. Area of canvas—mainsail 77.98; jib 22.50; total 100.48 square feet.

Dimensions of Racing Rig.—Mast 13 feet 6 inches, diameter 3½ inches; boom 16 feet 9 inches, diameter center 3 inches, ends 2½ inches; gaff 8 feet 6 inches, center 2¾ inches, ends 2 inches; bowsprit 6 feet 3 inches by 3 inches by 3 inches; extension outboard 3 feet. Sails—mainsail, boom 16 feet, leech 17 feet, gaff 8 feet, hoist 7 feet; jib on stay 12 feet, foot 9 feet 3 inches, leech 8 feet 3 inches. Sail area—main, 121.25; jib 37.50; total 158.75 square feet.

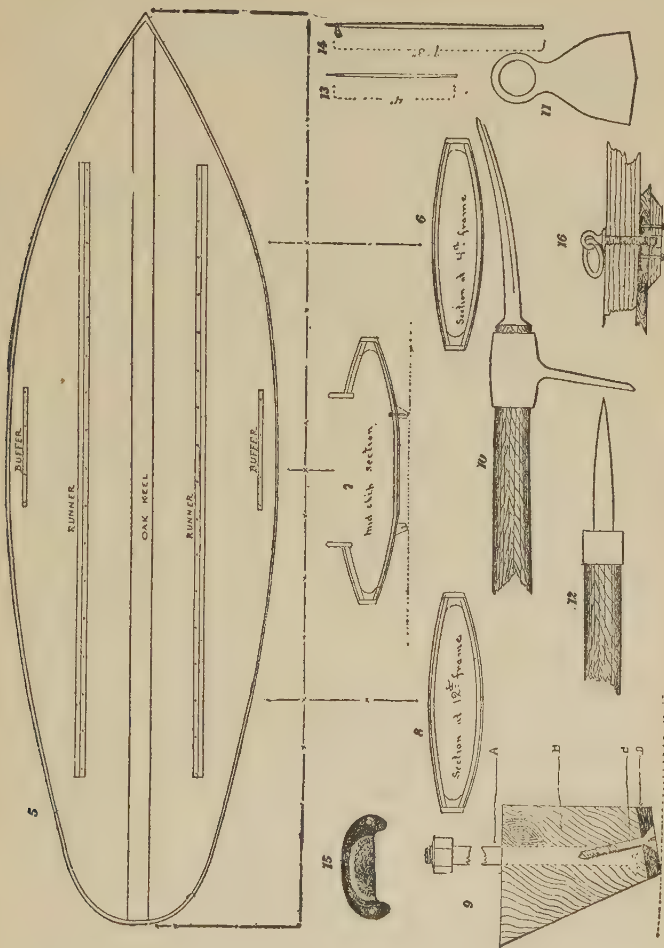
Rigging.—The standing rigging of racing is ¼-inch diameter steel. The stay and shrouds are looped over the mast, a thimble spliced at lower extremity and set up with lanyards. The smaller rig's standing rigging is of Russian hemp 7/16

of an inch diameter and set up the same way. The blocks are No. 1 bronze, or a good serviceable galvanized iron block.

Runners.—Of oak, and are 10 feet long by 2 inches high, and 1¾ inches wide at boat, tapering on outside to 1 inch. They are bolted to hull with 9/32-inch screw-head iron bolts, which pass through every other timber. The brass shoes are 1 inch wide and ¼ inch thick; they are fastened by 1¼-inch brass screws, spaced 7 inches apart, set flush, with all slots in heads running fore and aft. The tilt grade of cutting bevel of shoe is about 12 degrees. From inside to inside of runners is exactly 22 inches.

Pike-Poles.—Are two in number, the shorter one, plate 4, No. 12, is 4 feet long by 2 inches diameter; the longer or hoe pole is 7 feet 8 inches by 2 inches—in circumference the former carries only a pike, but the latter as well has a pike that is bent in opposite to the hoe. The hoe is 4 by 4 inches. Can be made in the shape as shown in cuts 10 and 11, or be in spade shape.

Bowsprit.—Of spruce. Fastening is shown in cut 16. A ¼-inch plate is bolted with an oak block underneath the king plank. A ring bolt passes through the bowsprit and then through the plate and king plank and block. The ring bolt has a thread its whole length, so that when bowsprit is removed it can be screwed flush with the king plank, and used to fasten the painter to. The heel of the bowsprit fits into an ordinary heavy brass draw-pull. See cut No. 15.



Details of Scooter

FOR KEY TO THE ABOVE DETAILS, SEE TEXT.

Oars, etc.—One pair of heavy 8-foot ash oars. They are secured by a block bolted to deck in which is inserted an oarlock. Always carry the oars in the boat. A wooden or canvas hatch is made to cover the cockpit.

CHAPTER XIV

SAILING ON SKATES

SKATE sailing next to ski jumping is the most bird like of winter sports. An ice boat can carry one at a greater rate of speed but hardly gives the same sense of flying. The personal element in skate sailing, the unique sensation of being a human sailing craft unto yourself, is the reason for this. Your body is the mast, your feet the hull and the skates are keel and steering gear.

This simple combination under proper wind conditions can travel across the ice at the rate of thirty, sometimes forty miles an hour, which is probably the greatest speed that most people have ever made on two feet.

A skate sailing rig is of course much more portable and far less expensive than an ice boat. If there isn't good ice on one lake, there always is on another and while impractical to move the ice boat to suit, it is always a simple matter to move the complete skate sailing outfit. You quickly roll it up when done with a day's sport and carry it home under your arm; a ten foot spar may be hinged or jointed to look like a fishing rod. Futhermore, one need be neither a skilled skater nor a sailor in order

to know the enjoyment of skate sailing. Practically all grown folk and young folk who skate can, with a little experience, learn how to handle a skate sail.

Skate sailing does demand a certain amount of practice on the part of a beginner. Until one has acquired the knack of the thing it is wise to venture forth only in a fairly moderate breeze. Many a first-timer who has been whirled across a sheet of ice to become entangled in a clump of brush on the far bank will vouch for the fact that a skate sail surely makes you travel but not always in the precise direction in which you wish to travel.

For which reason, one of the first requisites of your human sailing craft is that "she mind her helm." In other words, one should wear skates the blades of which have a reasonably sharp degree of curvature. Sharp turns and curves are frequently made and it is, of course, difficult to turn quickly with a flat-bladed skate. Either a figure skate or a hockey skate having a curved blade may do very well.

Another requisite is the presence of mind to drop the sail on the ice and glide off to safety with empty hands provided one is headed for danger zones and there is no other way out. I suppose it is only human to hang on tight to that which we have our hands on, whether it be a lot of money, a life preserver, or a skate sail. And perhaps it is for

this reason that the most simple and obvious of all methods of side-stepping trouble with a skate sail is not always taken advantage of. Safety with an unmanageable sail lies in its immediate release. Never use a sail which is attached permanently in any way to your hands, legs or body.

When there is a brisk breeze blowing and you hold up a skate sail, there is one thing which you do not do. You do not stand still. You go *somewhere,* and this at a pretty lively rate of speed. Any person who has ever sailed a small boat can readily pick up the trick of steering a course with the skate sail, for the principles are much the same. But one should also acquire a workable knowledge of "icemanship" such as is used in the handling of an ice boat; for example, cracks in the ice which are narrow enough to cross should be taken head-on instead of diagonally and bad streaks of ice warranted to disrupts one's balance should be avoided. In an ice boat, one is crouched low and cannot always spot bad stretches ahead; with a skate sail, one's standing position on the ice permits a keener sense of vision.

The methods of "tacking" and "coming about" with a skate sail are fundamentally the same as those of a small boat, although there are particular points of difference which I will mention presently. These points are largely dependent upon the pattern of sail used.

There are a dozen and one different types of skate sailing outfits used in Europe and on our own continent, some so elaborate that one is almost reminded of a full rigged sailing vessel, while as the other extreme we find the small boy tacking a piece of discarded bed sheet to a couple of sapling poles. Half way between these extremes are various types of skate sails which are workable, inexpensive and fairly easy to make. Through due process of elimination the two types which perhaps prove the most universally satisfactory are the triangular sail and the square sail.

The triangular sail, as a general type, may be cut in various patterns. Not infrequently it has a forward upright spar nine or ten feet high which is parallel to the skater, while the sail narrows down aft and comes to a point like a pennant. This is a good outfit, but a better one, I think, is a rig which is somewhat the reverse of this. The sail which I have in mind is similar in appearance and essentials to the rig commonly used in canoe sailing.

The main essential in which the lateen sail of canoeing differs from that of skate sailing is that all running rigging of the water craft is eliminated and there is substituted a wood spreader between the two spars. Crossing this spreader and parallel to the boom is a short wood piece which serves as a hand-grip while sailing.

The square type of sail has a greater tendency

toward the rectangular than square in shape. It corresponds in general outlines to the square sails carried by some sailing vessels, although of course modified in its skate sailing adaptation. There are upright spars at the fore and aft ends, and the boom, which serves as a spreader, runs horizontally across the center of the sail instead of being at the foot of the sail. While you are sailing, the boom rests upon your shoulder thereby differing from the lateen rig which is held in the hands.

We now come to the respective sailing operations of these two types of rigs. While tacking with a lateen sail one always keeps on the same side of the sail, which means that on one tack your position will be to the windward of the sail and another tack to the leeward of it. To "come about" you merely turn the head of your craft into the wind and get away on another tack.

The square sail, however, irrespective of whether you are sailing before the wind or beating to windward, is always kept between yourself and the wind —always to the windward of you. Furthermore, the process of coming about with a square sail is rather more difficult and quite different from that of the lateen.

The boom of the square sail rests on one shoulder and the trick of coming about consists of changing it to the other shoulder, making a right angle turn and getting away on the new course with the sail

in the proper position to windward. The most simple method of accomplishing this result and the one generally used is that of grasping with a free hand the upper part of an upright spar, steering into the wind and then quickly lifting the sail over your head and down on your other shoulder.

Because of the height of the lateen rig, not so great an amount of sail area can be carried as in the case of the square rig. Forty square feet of sail is a comfortable average amount for the lateen; more than fifty feet becomes unmanageable. A square sail of even more than sixty square feet may be handled with ease, although due consideration must always be given to the height and skating ability of the person who is to carry it. A rig which is made for a tall man's comfort is hardly likely to fit a short person.

As regards the respective merits of the lateen and square sails it may be said that the lateen is the more easily brought about. But it labors under the disadvantage of having to be held by the hands, and because of the fact that one sails always on the same side, there are numerous tacks, of course, in which the sail is pulling away from you.

In an excellent article on skate sailing by A. Valle in *Country Life* are given some working plans of both the lateen and square patterns of sail which this magazine has courteously allowed me to reproduce. These will be found in the pres-

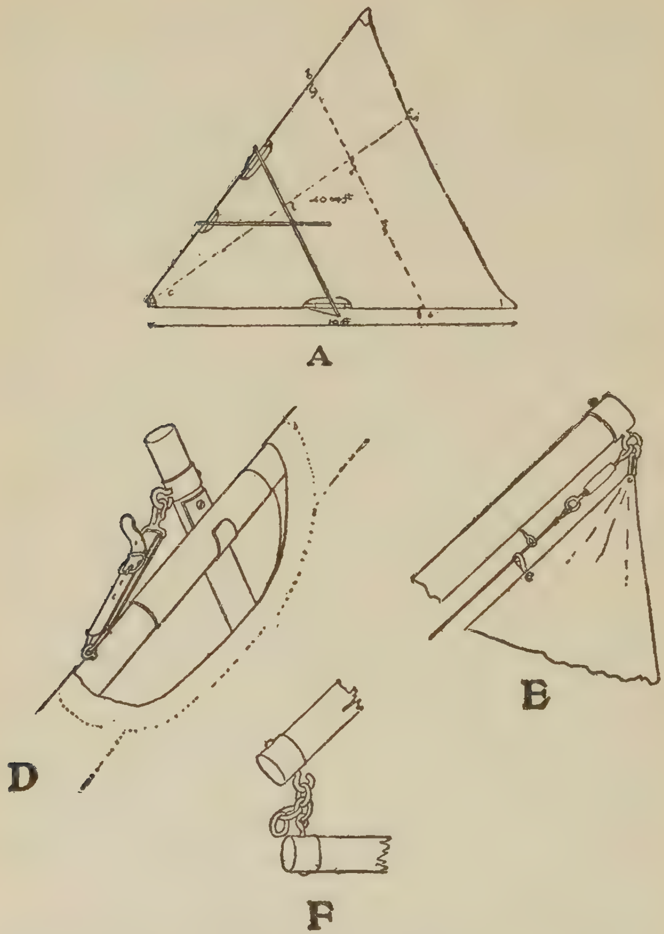
ent chapter and may be consulted in connection with all which follows.

Figure A shows a triangular or lateen sail having a sail area of forty square feet. There is one spar along the lower edge and one along the front upper edge. The stick running between the spars is the stretcher and the one parallel to the boom is the hand-grip. The spars can be made in jointed form similar to a sectional fishing rod and thus facilitate carrying. Thin steel tubing is perhaps the best material for jointing.

In Figure A the sail is shown with spars in the hems; D gives details of the attachment of the stretcher to the spar; E, the corner of a sail fastened by snap-hooks to a wire on the spar; and F, an adjustable attachment of spars. In explanation of these various points Mr. Valle says:

"The joining of the spars necessitates some attachment of the sail to them so that it can be readily loosened and stretched. Any one of a number of ways may be used. The simplest is to make a wide hem or pocket along each edge into which to slip the spars. Eyelets in the corners of the sail and strings at the ends of the spars serve to stretch the sail along them. The hems have pieces cut out midway of their length to give access to the joints and to fasten the stretcher.

"A better way of attaching the sail is to put small screw-eyes about eight inches apart along the spars, and to thread a wire tightly stretched through them, with a corresponding number of



DETAILS OF A TRIANGULAR SKATE SAIL. SEE THE TEXT.

little snap-hooks on the edges of the sail to hook on to the wires. This is the best fastening that has been tried, but it requires careful adjustment of the eyes and hooks, and some device, such as a turnbuckle, for taking up the slack in the wires. Rings sewed to the sail are also used; and some sails are laced to the spars as boat sails are; but it takes a great deal of time to tighten up the lacings nicely, and they are apt to work loose.

"The two long spars must be fastened together at the apex in such a way that they can readily be separated. They can, of course, be simply tied with string, but it is better to have a more permanent arrangement, such as metal hooks or links, for one finds that it is very disagreeable to have to tie and untie frozen strings or to make any adjustments on the ice. It is much better to arrange all fastenings beforehand and to leave as little in that line as possible to do out-of-doors.

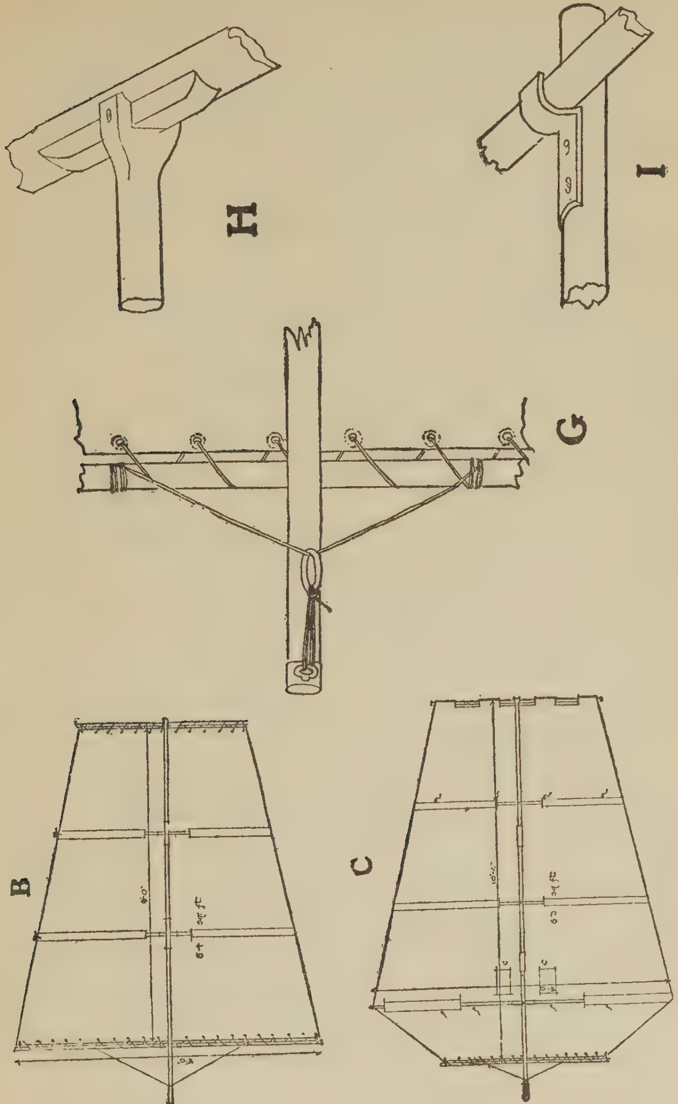
"The stretcher has a crotch or a flat hook at each end that fits over the spars at or near the joint. A string, or better, a doubled strap, attached to the spar forward of the stretcher, with a snap hook catching into a ring on the stretcher, serves to pull it forward and stretch the sail by pushing the spars apart. The object is to be able to stretch the sail tightly at first and to take up any slackness from time to time without too much trouble. The sail is generally held by the stretcher and the upper spar, but it is easier to hold if a fourth light stick is fastened across from the stretcher to the upper spar, about midway of the stretcher, and projecting back for a handle."

Two patterns of square sails are shown in figures B and C. The dimensions given are suitable for a person five feet eight inches tall or more; for a short person the height of the sails should be proportionately less. The after spar of C is shown in loops, a method more simple than lacing. The rectangles c-c indicate celluloid windows which can be built in if one wishes these. G shows details of the bridle and purchase at the forward spar while H and I are crotches at the after spar.

Figure B represents the square sail in its most simple form. It is fastened to a vertical spar at the front and back edges and stretched on a long horizontal spar usually having two or three intermediate battens in the pockets to keep it flat. Mr. Valle explains that a square sail is easier to handle and balances better if it has an additional front spar as shown in figure C. He goes on to say:

"In this shape only the horizontal spar and the intermediate vertical spar need be jointed for convenience in packing, for the front and rear spars are short enough as they are, and the battens in the pockets can each be made in two separate pieces. The front and rear spars may be slipped into wide hems or loops, or may be laced.

"The long vertical spar slips into a closed pocket at one end and at the other into an open pocket where there is an eye and a string or strap to stretch the sail. The long horizontal spar has a



TWO PATTERNS OF SQUARE SAILS.

crotch or hook at one end to fit over the rear spar, and a ring at the other to take a cord that leads from a ring on a bridle attached to the forward spar, so that a strong multiple purchase can be had for pulling the sail out flat."

CHAPTER XV

YOUR SKATES AND SKATING SHOES

YOU may have wondered why it is that there are so many different kinds of ice skates. One pair has blades which are long and rangy, while those of another pair are only a trifle longer than one's foot. Some blades seem hardly wider than the thickness of your thumb-nail and rest flat upon the ice, while others are almost as wide as a paper-cutter and the bottoms curve like a bended bow. It is a varied host of skates which confronts us. Each pattern seems to differ in some particular from the next. Why is it?

The fundamental reason for this great variation in skate construction is that no one pair of skates can be equally suitable for every kind of skating. There is a certain general type of skate which is needed for racing, another type for hockey playing, and a third for figure skating. You can have an all-round skate, of course, which is a combination of features of construction found in all three, but the specialized skate will always remain the best in its own particular sphere. The all-around skate in some shape or form is, of course, far more

generally in use in average skating than is a specialized pattern.

One general rule which applies to all patterns of skate is that a skate which is permanently screwed to the sole of a shoe is more satisfactory than one of the clamp type. I will go into this more fully further on. My second general ruling is open to some slight qualifications, but may be stated as follows: The flatter, longer, and narrower the blade, the faster the skate is. Or, on the other hand, the sharper the curvature of the blade and the wider it is, the slower the skate. I am speaking of course wholly from a relative standpoint; that is, it would be impossible to find a pair of skates which would give you both the maximum amount of straightaway speed and the maximum amount of ease in making a sharp turn.

As an example of flatness in blade carried to an extreme, we have the racing skate. To all appearances it rests absolutely flat on the ice throughout its length. With the true hockey skate, however, there may be only four to six inches of blade flat on the ice, while in the figure skate there are seldom more than one or two inches.

Such wide differences of curvature or, for that matter, degree of curvature in any skate, is what is referred to when the commonly misunderstood term "radius" is used. The radius of a skate is the radius of curvature of the blade. Imagine, for ex-

ample, a complete circle having a radius of seven feet, that is, a circle fourteen feet in diameter. If the curvature of a certain skate blade coincides with a section of this circle as long as the skate, that skate is known to have a radius of seven feet.

This rule is open to certain qualifications, in that an individual blade may sometimes have several different radii, especially so in the case of figure skates. The degree of curvature at either end is likely to be very much sharper than between the stanchions.

I will now take up the three general skate classifications which have been mentioned. First, the racing skate. The purpose of this skate is to get the greatest possible amount of speed mainly in a straight ahead direction. Longer and faster glides can be taken with a long blade than a short one. Hence, the length of blade.

The runner of a racing skate may range from fourteen to sixteen inches in length. The shorter length is usually used in the restricted area of rinks. A fifteen-inch length is the average for outdoor speed work. If a blade is too long, it becomes unwieldy.

The racing skate blade is made as narrow as is consistent with strength and ease in gliding over the ice. A narrower blade can be used on hard outdoor ice than on the softer ice of an artificial rink. Some blades are of uniform width through-

out, while others taper, say, from one-sixteenth of an inch at the toe to one-thirty-second of an inch at the heel.

Herein enters the element of individual preference. One speed skater swears by the blade of uniform width and the next favors the tapered blade. It is largely what one is accustomed to.

The blade of the best type of racing skate is not absolutely flat. There is a certain amount of curvature, although this is so slight that it is hardly perceptible. The reason for this is that even in straight ahead speed skating there is a certain amount of turning to be done, and in order to turn with any comfort it is essential that there be some curvature to the blades of the skates. Bobby McLean, the champion speed skater, uses racing skates which have a radius of forty-three feet. By way of comparison, it may be remarked that the radius of the standard rocker skate is seven feet.

Most racing skates used to-day are those of tubular construction. The "tubes" are a comparatively recent departure in skate design and quite different in appearance from the shiny, nickel-plated skates upon which most of us grew up. Tubular skates, as a rule, have a rather dull aluminum finish, although not always. The blade, of much harder steel than the rest of the skate, is set in a long hollow tube. Similar but wider tubes support the heel and front plates upon which the

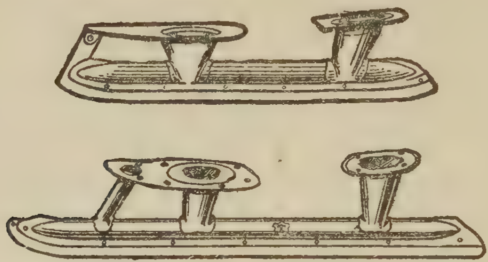
foot rests. The rear upright or stanchion is noticeably higher than is the front stanchion. Through courtesy of Alexander Taylor, accompanying drawings show the construction of "tubes" and other skate patterns.

If you wear a pair of tubular racing skates in a crowded rink you are likely to become decidedly unpopular unless there are toe attachments on the points of the skates. Without these, the knack of not tripping the other fellow becomes an extremely difficult accomplishment. A pair of these toe attachments costs only about twenty-five cents.

A tubular skate, whether it be of the racing or hockey model, is a remarkable combination of lightness, speed, and strength. Take an ordinary steel skate in your two hands, apply some muscle, and you will find that you can bend it out of shape. But with a tubular skate you can't budge the blade, however hard you try.

Eliminate two or three inches from the length of the present-day long, rangy racing skate and you have a blade which in length and degree of curvature is about the same as that of the original hockey skate. Such a blade, of course, would be almost flat on the ice for its whole length. And such a skate is being manufactured quite extensively to-day and can be classified as a hockey skate, although in reality it is a short racing skate.

You seldom see a skate of this pattern used in a hockey match at the present time.



ABOVE: THE TUBULAR HOCKEY SKATE.
BELOW: TUBULAR RACING SKATE.

The principle upon which this skate was evolved was quite logical. Hockey was a hard, fast game in which the main idea was speed. Hence, the need for a flat-bladed speed skate, although shortened somewhat so that it would not be unwieldy in the heat of play. For a long time the flat-bladed hockey skate served its purpose passably well.

Then came a day when the thought occurred to some bright mind that the game of hockey was by no means confined to straight ahead speed. There was constant dodging and there were numerous quick turns which called for quite as much lightning footwork as going straight ahead.

But it was physically impossible to make the quickest kind of turn with a flat-bladed skate. That is why the expert hockey player of to-day

uses a skate which has a noticeable degree of curvature. The radius of a true hockey skate is seldom more than fourteen feet, and sometimes it is not more than eight. It is a compromise between the racing skate and the figure skate.

There are hockey skates of the familiar nickel-plated variety, and there are those of tubular construction. For ordinary, all-around general skating, the nickel-plated kind is most favored. Among expert hockey players, however, it is the tubular skate which is almost invariably used. This skate will stand harder knocks than the other. The construction is the same as that of the tubular racing skate, except that the blade is shorter.

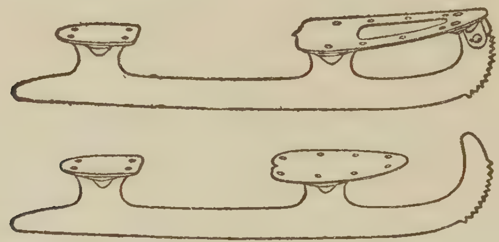
It often happens, however, that tubular hockey skates are made with blades which are too flat for satisfactory hockey playing. Hockey players overcome this drawback by grinding the blades to the particular degree of curvature which they wish. In doing this, one must be careful not to overheat the steel, or the temper will be drawn—first that of the steel and then your own.

With hockey skates having well-curved blades, you can try a whirl at figure skating, but you can never progress very far in this art. The curvature of a hockey skate is never sharp enough to permit satisfactory work. Better results can be accomplished even with the old-time rocker skate. But best of all is the well-made regulation figure skate.

This is really a highly specialized variety of the old-time rocker.

The radius of most figure skates ranges from five to seven feet. A favorite model is one having a radius of five feet between the stanchions. At the front end the radius is very much sharper. The blade curls upward and almost touches the toe of your shoe.

In some models, this upper end of the blade is permanently fastened to the toe plate of the skate.



TWO PATTERNS OF FIGURE SKATES.

There are expert figure skaters who hold that the better arrangement is that of having the end of the blade a short distance forward, free from the toe plate, their claim being that this freedom gives added flexibility to the foot. In either case, a distinctive feature of the figure skate is a series of small teeth something like those of a saw, located on the front of the blade just above the ice. These are used to grip the ice when making toe turns and doing similar stunts.

The popularity of tubular construction as signified by the presence of racing and hockey "tubes" has not heretofore been extended to the figure skate. At the time this is written, I doubt very much if there is such an article as a figure "tube" being sold. A considerable amount of experimental work has been going on, however, and just the other day I examined an advance sample of a tubular figure skate which may be in general use by the time these words are published. Possibly in time the figure "tube" will come to enjoy the same relative degree of popularity which the racing and hockey "tubes" do now.

Whatever kind of skates you buy, racing, hockey, figure, or a pair which may be one of a dozen different compromises between racing and figure skates, be sure that the steel is of good quality. Poor steel is quite as much of an abomination in a pair of skates as it is in a knife or axe. Almost any grade of steel, to be sure, will do for the top part of a skate but not so for the blade.

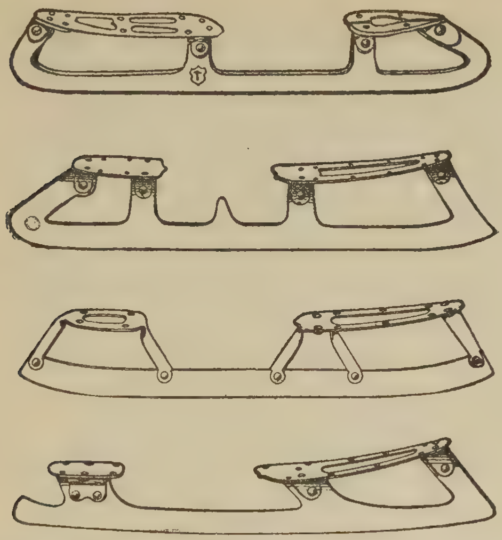
The selection of a good piece of steel is not always an easy matter, not so simple, for example, as selecting a good ski; for the grain of the wood tells its own story. A poor piece of steel with a little polishing and nickel plating can be made to look as pretty as a new silver dollar. About the only safe way is that of buying a pair of skates which bears the imprint of a reliable manufacturer

with an established reputation. Also, remember that good steel costs more money than poor steel. As a general rule, when you find that a manufacturer has neglected to stamp his name on a skate, you would do wisely in neglecting to buy it.

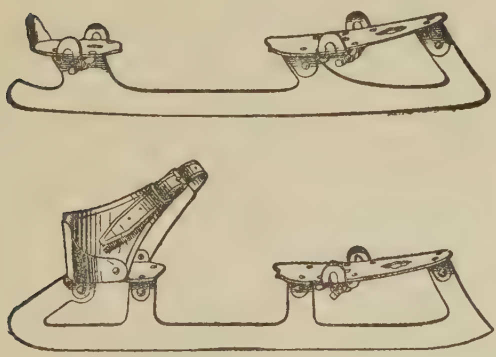
If you wish to get the greatest amount of enjoyment out of skating, your skates and shoes should be inseparable. The most satisfactory skate is likely to be one which is permanently screwed or riveted to a pair of shoes which are reserved exclusively for skating. The old-fashioned clamp skate, which worked something like a bear trap and kept your parents busy buying new shoes because of the good leather chewed to pieces, seems to have disappeared completely. But the type of clamp skate which works with a key (which is always mislaid) is still going reasonably strong. By no means do I altogether spurn such a pair of skates. I am speaking entirely from a relative standpoint.

You can have plenty of good fun, of course, on clamp skates, but you can have better fun with the screwed-on variety. Even the best clamp skate can never give a skater the sense of security, the comfortable feeling that the skate is a part of the foot, such as is experienced when you wear a skate which is firmly screwed to the soles of your shoes.

The old belief in ankle supports is a tradition



A FEW "ALL-AROUND" SCREW-ON SKATES, SHOWING THE VARIETY IN CONSTRUCTION.



TWO TYPES OF CLAMP SKATES.

which dies hard. The ancient leather supports and straps which ranged around the rear part of the foot like a high board fence are still found on some women's and children's skates. When a clamp skate is worn, such support is a distinct help. But a regulation skating shoe with skates screwed to the bottom will give every bit as much if not more support. If the shoe itself is not enough, an ankle strap can always be added. Some skating shoes are made with sewed-on straps, a rather good arrangement for especially weak ankles.

A unique ankle support device which eliminates the constriction of the ordinary strap across the front part of the foot is one which runs upright at the extreme rear of the foot. By means of a hinge and sliding attachment it is possible for the ankles to bend forward or backward but not sideways.

Skate construction enters to some extent into the question of ankle support. A person with especially weak ankles should use a fairly low skate. The higher the foot is above the ice, the greater the strain upon the ankles. A person with strong ankles likes a high skate because it gives extra leverage upon the ice.

Most skating shoes are of the same general type. This is the "blucher" model, which laces all the way down to the toe. But there are a number of variations in this, and it oftentimes happens that

a certain kind of shoe is especially suitable for a certain kind of foot, skate, and skating. In fact, it is essential that a pair of shoes fit all three

THE HINGE ANKLE SUPPORT.

of these. If you buy your shoes at the same time you do your skates, so much the better.

Most outfitters, in addition to selling shoes and skates separately, have various combinations with the two ready attached, which is an excellent arrangement provided both members of the combination are of good quality and are exactly what you want, but hardly so if you find that you get a better combination by buying the two members separately.

The average person finds himself most at home on a pair of skates when the position of the foot on the skate is much the same as when walking. In

both cases, there is a slight forward pitch to the foot. This may not be very evident, but when

TYPICAL SKATING SHOES (WOMAN'S AND MAN'S RESPECTIVELY) ATTACHED TO AN UNUSUAL TYPE OF "TUBE" SKATE.

you put on a pair of tennis shoes you notice the difference.

It is well to take this element into account when buying skating shoes. Some skates, notably those of the tubular type, have high rear stanchions. If

a shoe having a heel were worn with such a skate, the rear part of the foot would be perched up in the air in an uncomfortable position. But it also happens that shoes which are especially made for this type of skate have such extremely low heels that they might be called heelless.

Such a shoe can also be worn with a skate having a low rear stanchion. The average skater, however, who wears a skate of this sort feels more at home with a shoe which has a heel. This raises him up to his walking position, or, in other words, his foot is the same relative distance above the ice as that of the man on "tubes" wearing a heelless shoe.

The shoe which is worn for figure skating invariably has a heel. The leather should be fairly soft and flexible, yet of sufficient sturdiness to stand considerable strain. The type of shoe used for ordinary skating may also be suitable for figure work. But as soon as you become fairly expert in cutting figures you will probably want a regulation figure-skating shoe such as is worn in exhibition work.

This shoe is noticeably higher than others. It reaches nine or ten inches above the heel. Most other skating shoes, with the exception of some women's models, are not more than six inches above the heel.

Any skating shoe which fits properly should

give sufficient support to the foot without the necessity of extremely tight lacing. When the laces are drawn together too hard the result is not good for foot circulation. Furthermore, ridges and calluses are likely to form under the laces. If tender spots do develop on the front part of the foot, it is wise to insert a detachable sheepskin tongue.

The feet must be kept warm and dry. With cotton stockings, they can be neither. Good wool stockings are the only thing. Not only is wool warm, but it also furnishes an easy cushion around straining muscles. The shoes should be oiled from time to time. This keeps out the wet and the shoes remain soft and easy.

One of the first and last essentials of the screwed-on type of skating gear is that the skates be fastened true and straight to the shoes. If one of the skates is noticeably out of true, there is likely to be a constant wrenching of the ankle. In addition to this, the leather sometimes buckles.

If you do the job yourself, proceed as follows. Place the skate centrally on the sole of the shoe, so that the center line of the blade conforms with the center of the toe and heel, although perhaps with a very slight tendency toward the outside of the shoe. Mark the spots on the sole where the screws are to go; then take your awl and bore a hole in the one at the extreme end of the toe plate. Next,

bore a hole at the extreme end of the heel plate, diagonally opposite from the first.

Sink screws in each of these holes, but not all the way in—just tight enough to bring the skate and leather fairly close together. Make sure that the blade is on straight and then bore two more holes and sink two more screws in the same manner at the remaining two extreme toe and heel plate positions.

Keep on alternating in this manner until all the screws are in. Finally, go the complete rounds with the screw driver, giving each respective screw the turn or two which are necessary in order to bring the toe and heel plates firmly against the leather.

Confusion sometimes exists concerning the comparative sizes of skates and shoes. If, for example, one were to buy sight unseen a pair of number 9 skates under the impression that these would fit a pair of number 9 shoes, there would be nothing left to do with said skates but to give them away to the smallest boy in sight.

No table which might be given showing the comparative sizes of shoes and skates could be absolutely correct, for the reason that shoes vary to such a great extent. I have previously suggested the wisdom of buying shoes and skates together although, of course, this is especially applicable to the screwed-on varieties of skates. This proceed-

ing, however, is not always practicable during Christmas present season and under various other conditions; for which reason, the following table compiled by a Canadian skate manufacturer may prove of some value.

As I have said, this can be only approximately correct. Both skates of the screwed-on type and clamp skates are considered. You will note that for a given size of shoe, the clamp skate demands a trifle larger size than does the screwed-on type. The table is as follows:

Hockey and all other skates which screw to the boot			Clamp skates — all skates which do not screw to the boot		
Class	Size boot	Size skate	Class	Size boot	Size skate
Girls	11	7½″	Girls	11	8″
	12	8″		12	8½″
	13 & 1	8½″		13 & 1	9″
Women	2½	8½″	Women	2½	9″
	2½ & 3	9″		3 & 4	9″
	4 & 4½	9″		4½, 5½	10″
	5 & 5½	10″		6 & 6½	10½″
	6 & 6½	10½″		7	11″
	7	11″			
Boys	11	7½″	Boys	11	8″
	12	8, 8½″		12	8½″
	13, 1, 2	9″		13, 1, 2	9, 9½″
	3, 4	9½″		3 & 4	10″
	5	10″		5	10½″
Men	6 & 6½	10½″	Men	6 & 6½	10½″
	7	11″		7	11″
	8 & 9	11½″		8	11½″
	10	12″		9 & 10	12″

A fine pair of skates is worthy of good care. Leather scabbards to protect the blades from thumping and banging when the skates are not in use is a protection which is not taken advantage of half so much as it should be. And needless to say, unless skates are kept cleaned and oiled they will rust, especially at the joints. When you put your skates away for the summer, give them an especially good coat either of oil or vaseline.

CHAPTER XVI

THE FUNDAMENTALS OF FIGURE SKATING

WHY is it that one person becomes expert in a certain sport while another who tries equally hard for expertness always remains in the "duffer" stage? You will find this true of almost any sport you may name—golf, tennis, swimming. And it is especially true of skating. The rank and file of us, of course, are duffers and there is no disgrace attached to the fact. But merely through the simple process of adding a little more headwork to our footwork efforts, it is safe to say that there would be many more experts among us.

The main difference between the expert and the duffer is evident in the fact that the expert never attempts fancy tricks until he has thoroughly mastered the simple fundamentals of his game. He knows that a building cannot be erected without a foundation. And during every moment, while practicing the fundamentals and later on while making fancy figures, he knows every moment exactly what he is trying to do.

The duffer, on the other hand, approaches his problems with somewhat muddled ideas as to what

he is trying to get at. He becomes panicky and substitutes much aimless physical exertion for headwork. Then comes a certain amount of confidence and the far advanced fancy tricks appeal to his imagination, so he takes a whirl at these instead of devoting conscientious practice to the fundamentals upon which the advanced work is builded. In a previous chapter I have said that the reason why some skiing beginners do not get along very well is because their first interest is centered upon the spectacular rather than the fundamentals. By way of analogy I have mentioned the game of golf. The same analogy might be used in connection with figure skating. Just as the golfing beginner who attempts the spectacular full swing before mastering the minor shots which lead up to this will never become an expert golfer, so the skater who spends much time trying to master fancy figure "eights" without having had the necessary preliminary practice in the fundamentals upon which these are builded, will never become a skater of fancy figures. Neither one knows what he is trying to get at.

The fundamentals of all the three hundred odd movements in the art of skating are as follows: straight ahead skating, straight backward skating, turns to right and left, skating on the outside edge forward, skating on the inside edge forward, on the outside edge backward and on the inside edge

backward. I will explain the meaning of "edge" skating presently. After you have mastered these few movements you are entitled to call yourself an expert at skating. Each of the many dozens of fancy figures that comprise the knack of figure skating are direct applications of one or more of these movements.

Of the first three of these movements, I will make but passing mention. As regards these, very likely you can handle yourself creditably already. In which case, you know that the secret of skating is balance. This applies with equal force to plain straight ahead skating and the most intricate fancy figure. So it is wise to develop a fine sense of balance early in the game, note how easily a wrong movement may completely cripple and destroy balance, watch expert skaters and see what an important rôle the movement of the shoulders plays in skating, how a bent skating leg gives easy spring to the body.

It might also be worth while to make a mental note of the difference between walking and skating. While walking, you progress by means of the foot upon the ground, but in skating all impetus comes from the foot which has just left the ground. In walking, the ball of the foot does the steering and the body follows, but in skating when you wish to turn to the right or left, the shoulders and hips do the steering and the foot follows suit. It

is because of lack of knowledge of this difference that many skaters have difficulty in making turns. And one can never be a figure skater without first being expert at turning.

The knack of the plain forward and backward strokes and the turns are readily acquired by the average skating beginner in a few days or weeks. There are those who through this accomplishment consider that they have reached the summit of the art of skating and make no attempt at further advancement. Perhaps a few stray attempts are made into the realm of figure skating but these prove so unsuccessful that no further efforts are made to master it. Figure skating is by no means easy. It requires long and painstaking practice. But first of all it requires a knowledge of what one is getting at and the manner of going about it. Or, in other words, the ability to grasp new principles and combine these with the fundamentals which have been learned in plain skating.

Let us take up these new principles. In ordinary forward or backward skating the position of the skate during the greater part of the time is vertical; that is, the width of the blade is resting flat upon the ice. But if you will observe closely the movements of an expert figure skater as he swoops gracefully around in a circle you will note that his body is tilted and also the skate underfoot is tilted so that it runs on edge instead of being flat. Only

by tilting the skate in this way is it possible for him to describe the circle.

The type of skates which this expert wears is another important consideration. As indicated in the preceding chapter, only when wearing skates having a fairly sharp degree of curvature can one hope to make satisfactory progress in the art of figure skating.

In your ordinary straight ahead skating it is possible that you may not have been wholly aware of the presence of "edges" on your steel blades. If so, the importance of these is the first thing to be learned when you begin to think about figure skating. On each skate there are two edges, the inside edge and the outside edge. The inside edge is the one on the inner side of the foot while the outside edge is that on the outer side of the foot. When a skater is progressing on the right foot in a curved direction to the right he is on the outside edge. When he is gliding on the right foot in a curved direction to the left he is on the inside edge.

We now come to the remaining four fundamental movements which are the basis of all figure skating. As previously remarked, these are skating on the outside edge forward, skating on the inside edge forward, on the outside edge backward and on the inside edge backward. Indeed, while performing any of these movements you can with

perfect truth call yourself a figure skater, for any one of these might be classified as a figure.

The most logical step by way of introduction to this edge skating is a movement know as the "outside edge roll forward." This is similar to ordinary skating in that one proceeds forward across the ice, but differs from it in that every stroke is made upon the outer edge of the skate and the marking left upon the ice is quite different. In ordinary straight ahead skating the mark left after a stroke is the arc of a small segment of a very large imaginary circle. With the "outside edge roll" movement, the marking left is a full half circle of smaller diameter.

We will suppose that it is the left skate which gives the "kick off" for the necessary impetus which starts this movement (the kick off should always be made with the edge of the blade instead of the point). The right skate tilted on its outer edge has started to describe a half circle to the right from this impetus. The weight of the body is thrown forward on the right leg and this leg is bent at the knee. At the same time, the body is tilted toward the inside of the half circle which is being described. And of great importance, the left shoulder should be pressed well back. The left foot is carried behind, raised about a foot above the ice.

While this half circle is being described on the

right foot, the left foot is gradually swung forward, but not past the right, until the time comes to bring this left into action. Then, as the end of the half circle is reached, the weight of the body is shifted to the left foot, the left skate goes on its outer edge and describes another half circle off to the left. During this second stroke, of course, the position of the body and shoulders is reversed. The left side of the body leans toward the inside of the circle, the right shoulder is pressed back and it is the right foot which is carried behind.

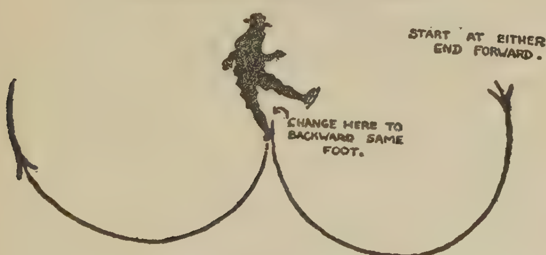
As the end of this second half circle is reached, the right foot with its respective direction and positions again takes to the ice. And so on one alternates from right outside edge to left outside edge as long as he pleases. The figure of a skater swooping across a stretch of ice in this manner is an extremely graceful sight.

The next logical step in the education of the fancy skater is the "inside edge roll forward." As in the movement just described, one proceeds forward across the ice, but in some respects its execution is quite the opposite. Obviously, in this case the skating is confined to the inside edges of the respective skates.

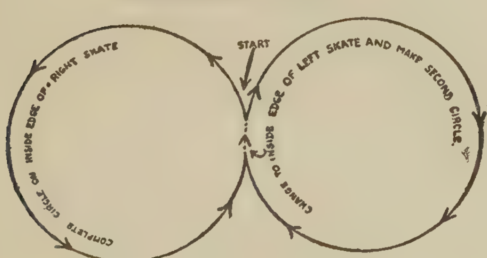
As in the former movement we will suppose that it is the left skate which gives the kick off. Similarly again, the right skate is about to describe a half circle. But at this point there enter impor-

THE OUTSIDE EDGE FORWARD

THE INSIDE EDGE FORWARD



THE FIGURE "THREE"



THE FAMOUS "FIGURE EIGHT"

tant differences. The curve is described on the inside edge of the skate and inward toward the left instead of outward toward the right. Note also the different position of the shoulders. In this case it is the right shoulder which is pressed backward. The body leans toward the inside of the circle and the left foot is carried behind.

The left foot is gradually brought forward and as the end of the curve is reached it takes to the ice and assumes the weight of the body. Another half circle is now skated, this time on the inner edge of the left blade. The position of the shoulders, of course, is reversed. It is now the left shoulder which is pressed backward. This inside edge movement, like the former outside edge movement, can be continued across the ice for as long a time or distance as it suits one's fancy.

The next two steps in skating are the "outside edge roll backward" and the "inside edge roll backward." It is hardly necessary to enter into a description of these, for they are in all essentials a duplication of the two forward edge movements except that they are skated backward. With the foundation acquired through learning the plain backward stroke of ordinary skating and the two forward edge strokes, the backward edge strokes follow fairly easily.

In the above mentioned four "roll" movements, the marking left on the ice after each stroke is that

of a half circle. But the figure skater must be able readily to describe a full circle. Indeed, he must be able to make a complete circle in four different ways: that is, on the outside edge forward, inside edge forward, outside edge backward and inside edge backward. (These, of course, are performed as separate units and not in conjunction with the roll movements.)

The practice which the skater receives in his four "roll" movements familarizes him with the manner of handling the edges of his skates, and as a full circle is but a continuation of a half circle, with a little more original impetus it is not a very difficult matter for him to acquire the knack of this. Plenty of practice in describing large circles both forward and backward, on outside and inside edges, is necessary before one is in a position to tackle some of the more intricate figures of fancy skating. Either a half circle or full circle is a fundamental element of every fancy figure skated.

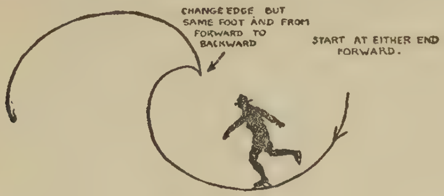
At about this stage of the game, one can launch forth upon the figure "eight" with some manner of success. An "eight" consists merely of two attached circles performed on the same edge of the skate, but with a change of feet. In fact, it would be quite similar to two consecutive strokes of the "outside edge roll forward" movement except for the fact that it consists of two full circles instead of half circles.

The figure "eight" can be skated in four different ways: that is, on either of the two edges forward or either of the two edges backward. Let us suppose that you wish to use the inside edge forward method. Describe a complete circle on the inside edge of the right skate, carrying the left foot behind free of the ice. When about two-thirds through, bring the left foot slowly forward and at the end of the circle the inside edge of the left skate takes to the ice and makes a duplicate circle, which completes the "eight." The balance of the body while making these circles is similar to that described in the "roll" movements. The body leans toward the inside of the circle.

In interesting contrast to the figure "eight" is the "three." The former, it has been mentioned, is skated on one edge and two feet. The "three" is skated on one foot and two edges. It is really a combination of two half circles. We will suppose that the first of these is made on the outside edge forward. Halfway through the figure the balance of the body is shifted, the edge of the skate turned and the remainder of the stroke is completed on the inner edge skating backward.

Another figure which is skated throughout on one foot is the "rocker." This looks something like a three, with one of its half circles turned the wrong way. The first half of the "rocker" is skated forward and the last half backward, but in

both cases on the same edge. If you start this figure on the right outside edge forward you skate the last half on the right outside edge backward.



THE ROCKER

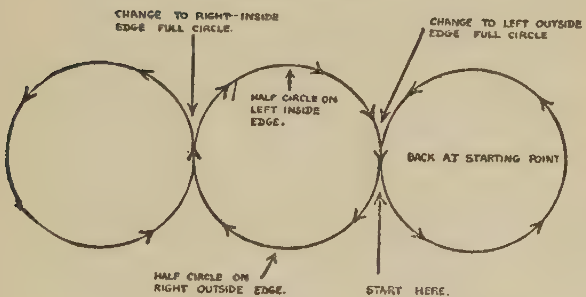
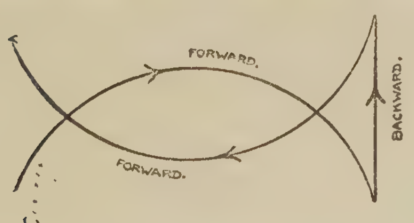


FIGURE EIGHT WITH EXTRA CIRCLE ADDED



THE ANVIL

The "change of edge" is a figure well worth learning. This consists of three circles in a row—an "eight" with another circle added to it. The

method of skating this is as follows: First describe a half circle on the right outside edge forward and then prolong this into a complete circle on the inner edge of the same skate. At the end of this circle change to the left foot and skate for a half circle on the inner edge of this. Then prolong this stroke into a complete circle on the outer edge of the same skate. This brings you back to the starting point after having completed three circles.

A more simple figure to execute is the "anvil." This is skated throughout on the outer edge of the skate. First make a half circle forward, then a straight line backward and follow this up by making another half circle forward in such a way that the two arcs intersect. Four of these "anvils" skated from a common center leave on the ice the markings of a very fancy figure known as the Maltese Cross.

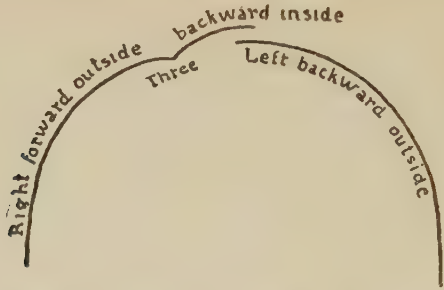
These few figures which I have described are especially popular among followers of figure skating. These are probably warranted to keep any ambitious fancy skater reasonably busy for some time to come. But after he has mastered these he need not complain that there are no new worlds to conquer, for there are scores of other figures awaiting the signal from his steel blades. And let him always bear in mind that each one of these numerous figures is but an application of the few fundamental movements mentioned earlier in this chap-

ter. The obvious moral is that it is wise to learn thoroughly the fundamentals.

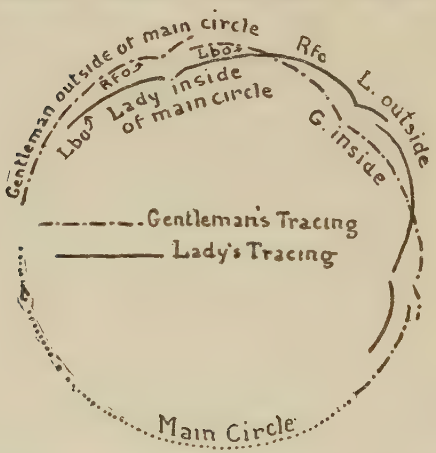
Some mention should be made of "pair" skating, although this subject need hardly be gone into in great detail. All the rudiments indicated in the foregoing are in this case applicable to two people skating together instead of one person alone. Quite a number of figures as, for example, the "three," "rocker," and "change of edge" can be skated by partners as well as singly. Oftentimes during a figure, the position of one partner is exactly the reverse of that of the other but this fact does not alter the rudiments.

With music playing, perhaps the best of pair skating is the graceful rhythmic waltz. The ordinary skating waltz, sometimes called the "once back" is hardly more than a series of figure "threes." The position of the partners in a waltz is similar to that taken by a couple on a ballroom floor and during the dance they revolve in somewhat the same manner. Their glides, however, are likely to be measured in yards instead of inches.

There is one point of difference between the execution of the ordinary "three" and the waltz "three." As previously mentioned, when skating the three alone, the final semi-circle of the figure is skated backward with the same blade upon which the first semi-circle has been skated but on its opposite edge. Just so with the waltz, the second



DETAIL OF THE "ONCE BACK" WALTZ.



RESPECTIVE TRACINGS OF PARTNERS DURING THE WALTZ.

half circle is skated backward by one of the partners and started on the same blade. But it is finished on the other blade.

A man and woman, we will say, are partners and they are halfway through the first movement the waltz step, or in other words they are half-

way through a long circular glide which when completed will constitute the first semi-circle of the figure "three." The man at the present moment, we will suppose, is skating RFO, which means of course that he is going forward on the right outside edge. The position of his partner is exactly the reverse. She is skating LBO, meaning thereby, backward on the left outside edge.

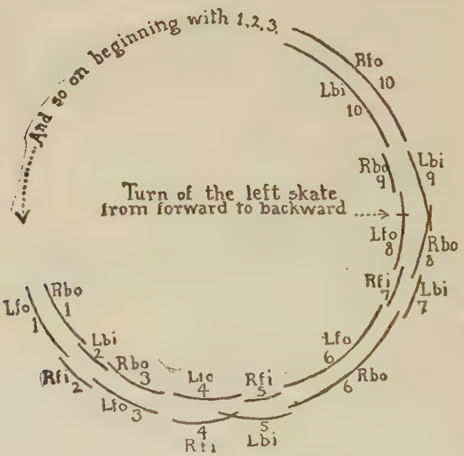
At the turning point in the "three," the end of the first semi-circle, the partners simultaneously revolve. The woman's position becomes RFO, the position which the man has held up to this point. The man changes to RBI, skates a short part of the second semi-circle backward on this blade but presently changes feet and completes the semi-circle skating LBO. The woman throughout is skating forward, the man backward. Except for the reversed position of the partners, the arc described is similar in every respect to the first arc. Then comes another turning point in the "three," the couple revolve again and now it is the woman who is skating backward. Accompanying drawings from *Outing* show how this is done.

A series of arcs executed in this manner assumes the general form of a large circle; that is, in time the couple comes back to the starting point. If instead, they wish to follow the general direction of a straight line down the ice, this can be accomplished by reversing now and again when they are

about to revolve at the turning point of the "three."

A somewhat livelier waltz than the ordinary "once back" which I have just described is the "ten step." This is composed of ten steps divided into four beats. Steps one, two and three are the first beat; four, five and six are the second beat and seven, eight, nine and ten are the third and fourth beats. The steps are different from those of an ordinary waltz although the position of the partners is the same.

The first three steps of the man, we will say are LFO, RFI and LFO; the simultaneous respec-



THE "TEN STEP."

tive steps of his partner will be RBO, LBI and RBO. This brings them to the second beat. The

change from steps three to four is skated with nearly a half turn and on four and five this is completed so that the man skates backward and the woman forward. With steps nine and ten, the partners make their final turn and then start all over again with one, two and three.

In none of the foregoing chapters have I said anything about the unpleasant experience of breaking through the ice. The present moment is perhaps the most appropriate time to speak of this important subject. Although no set rules can be given regarding the thickness of ice which represents safety, it is commonly agreed that two inches of fresh water ice will hold people who are properly distributed over the surface and six inches will hold crowds that keep in motion. The holding power of salt water ice is considerably less than that of fresh water.

Now, we will suppose that a person does break through the ice. How will he be brought out to safety? Here again, no set rules can be laid down, for conditions vary. It may be said, however, that unless both the person in the water and the rescuer keep level heads they are likely to make two serious mistakes. These are as follows: the person who has broken through may attempt to climb up upon the thin broken ice while awaiting the arrival of the rescuer who is fast hurrying to the scene, whereas the rescuer on his part may be courting danger by

walking on the thin ice. This combination has more than a few times resulted in a double tragedy.

The person who has broken through should, as a rule, attempt merely to support himself in the water until help arrives. The rescuer, before starting to the rescue should, if he can spare the time, hunt for a fence rail, a tree limb, a long board or some similar object, crawl out on the ice with this and push it to the person in the water. If the rescuer can manage to tie a rope around himself and have this attached to the shore, so much the better. In case the rescuer is forced to venture across the thin ice with neither rail nor rope safeguards he must bear in mind that a body which is sprawled flat upon the ice gives a much safer distribution of weight than does one which is standing upright. The rescuer should lie flat on his face and squirm forward.

The person who breaks through thin ice when alone with no help in sight is in an especially serious fix, although not necessarily a fatal fix if he keeps his head and gives due regard to distribution of weight. He cannot, as a rule, climb up on the jagged ice but the chances are that if he uses method, he can squirm up. We will see how this may be accomplished.

While keeping afloat as best he can, let him proceed to break up the thin ice ahead so that something of a V-like water lane is formed. Then if he

will work his way to the apex of the V, turn his back to this, rest the back of his head on the ice and at the same time place each arm and leg in their respective positions on the ice, he will have an equitable and gradual distribution of weight which will permit him slowly to squirm backward to safety.

CHAPTER XVII

THE HOWS AND WHYS OF ICE HOCKEY

THROUGH due process of unscrambling that old-fashioned mad scramble on ice known as "shinny" and adding lightning-like speed of feet, arms, body and mind we have the scientific and always spectacular game of ice hockey, a sport which is sometimes called the fastest game on two feet. Fundamentally, hockey is shinny. But it is very much more besides.

When you played shinny, you didn't exactly know what you were trying to do or if you did, you hardly stopped to figure out the best way of doing it. The main idea was to get there as fast as your skates could carry you. That in some respects is also the main idea in the more intelligent game of hockey. Shinny training always stands a prospective hockey player in good stead. But there are many new things for him to learn.

Either the prospective hockey player or the spectator who expects to watch a game with any degree of understanding must first learn what the game is all about and how it is played. This is more true of hockey than perhaps any other sport

played on two feet, for the game of hockey is such a fast and furious performance that to many spectators it seems to be the same mad scramble as shinny. Yet a well-trained hockey team works like a nicely oiled machine. In spite of all the excitement, every cog is in its place and running smoothly.

In order to be as clear as possible, let us begin with more or less obvious essentials. The game of hockey is played on a rectangular field of ice which need not be of any specified size so long as it is as large or larger than the minimum size set down by the rules. The minimum size adhered to for some years past in the United States is one hundred and twelve feet by fifty-eight feet. In Canada, it is larger.

At either end of the field is a goal net supported by two upright posts four feet high and six feet apart. The object of the game is to score the greatest number of points and the team which sends the ball into the opposing team's goal net the greatest number of times is the winner. The ball is known as the "puck" and this consists of a disk of vulcanized rubber three inches in diameter and one inch thick which throughout the game is being continually whizzed across the ice or through the air or moving forward in contact with a hockey stick in the hands of a speedy, dodging player. In any case, only the stick can be used in ad-

vancing the puck. The puck cannot be held in the hand, thrown, or kicked with the skate.

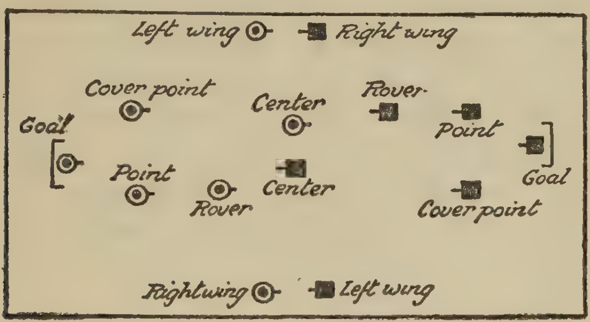
The length of a game may be either two or three twenty minute periods of actual play with a ten minute intermission between each or whatever time arrangement is agreed upon beforehand. A hockey team may consist of either six or seven players, although, of course, two teams playing together must have the same number of men. This matter of six- or seven-man teams is one about which there has been considerable controversy and it is likely to be a moot point for some time to come. Most teams now make use of only six men but some play seven, especially in informal contests, where as many as possible wish to get into the game.

The game remains in all essentials the same, whichever of the two arrangements is used. The claim is made for the sextette method that it speeds up the game and discourages "loafing off-side." This last term refers to a player who makes a practice of staying between the puck and the opposing team's goal and waiting there for the play to come up to him instead of his being behind the puck as he should. This practice is an infraction of the rules.

A seven-man hockey team consists of the following positions: Goal keeper, point, cover point, rover, center, right wing and left wing. The first

three named are defense players and the remaining four are forwards or offensive players. Let us see their respective places on the playing field when the game is about to begin.

The goal keeper stands directly in front of his net at the end of the field. A short distance in front of him are the point and cover point. The



THE LINE-UP OF TWO SEVEN-MAN HOCKEY TEAMS.

cover point may either be in front of the point or the two may be side by side but with some space between them. This latter arrangement is usually the most effective. It is known as the "parallel defence."

Between these two men and the center of the field, although slightly to one side, is the rover. Further forward and far out toward each side of the field are the respective right and left wing positions. In the other half of the playing field, the opposing team takes the same respective positions.

The two opposing centers face each other in the center of the rink and when the referee throws the puck on the ice between them the game is under way.

There ensues a wild twenty minute burst of speed, up, down and across the ice with the rubber puck whizzing here, there and everywhere. During this period there are only two men of the entire fourteen upon the ice who remain consistently and constantly in one spot. These are the two goal keepers, one at either end of the field. For this reason, the goal keeper's opportunity for spectacular play is distinctly limited but there may be some manner of compensation in the fact that his position is in some respects the most responsible on the team.

Not every hockey team is gifted with a good goal keeper. It is a position which seems to call for a certain kind of temperament—constant coolness and quick thinking and a refusal to be drawn into the danger zone in the heat of excitement. The good goal keeper never ventures away from his net unless he knows he is absolutely safe in doing so. When the opposing team comes whizzing down the ice with the puck he must forego all temptation to skate out and meet them. His is entirely a waiting game. His eye is on the puck every minute and when it travels toward him through air or along the ice, he instinctively knows

the spot between the goal posts for which it is headed. He is there with hands, body, skate or stick to block it.

I have said that the rules of hockey do not permit a player either to hold the puck in his hands or kick it with his skate. But it is allowable to stop the puck either by your hand or skate. And these are favorite methods by which the goal keeper prevents scores being made. We will take, for example, a shot directed toward the upper right hand corner of the net. The most practicable method of blocking this is by reaching up and stopping it with the right hand.

Suppose, however, that the puck is whizzing along the ice headed for the lower left-hand corner of the net. The natural position of the blade of the stick as held by the average goal keeper being to the right, he is likely to have his troubles in bringing the blade around to the left hand corner in time. But by sliding out his left skate in the pathway of the oncoming puck, the shot is readily blocked.

Some of the best goal keepers rarely use their sticks to block shots. Hands, legs, skates and body are oftentimes the main buffets and the stick is used mostly to knock the blocked puck out of the danger zone.

The positions of point and cover point like that of goal keeper are defensive but not so to the same

extent. Not infrequently, one of these two men is privileged to take the offensive and scoot toward the opposing team's goal with the puck. But these offensive privileges must not be abused. The men playing point and cover point must always bear in mind that primarily they are defensive players, that their main job in the game is to see that the opposing team does not score upon their own. When one of these defense men is carrying the puck down the ice it is oftentimes good team work for some other player to drop back and take care of the undefended territory.

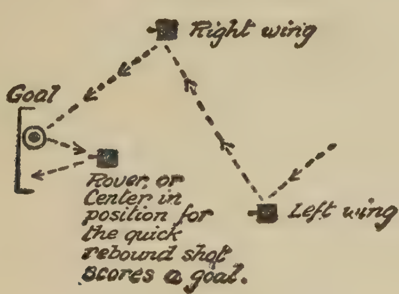
The most spectacular players on a hockey team are the men whose main business it is to rush the puck toward the other team's goal and make a score. These four offensive positions are the rover, two wings, and the center. The men who play these positions must be especially fast and strategic skaters with plenty of lung power and muscle, for they are on the go every minute.

The position of rover is the one which is eliminated by six-man hockey teams. But in the seven-man game the rover usually makes his presence very evident. A man who is a brilliant individual player is especially suitable for this position. The rover is something of a free lance who goes and comes pretty much as he pleases although of course he must never forget the necessity of good team work.

One of the greatest hockey stars the game has ever known played the position of rover. I refer to the late "Hobey" Baker. The brilliancy of his playing was a thing of unceasing marvel. A game very often had the appearance of being played by Baker alone.

The men who play the two wing positions usually do most of the puck carrying and when either has skated to strategic positions before the goal, he takes advantage of it. It by no means follows, however, that because a wing has carried the puck the length of the field in spectacular manner he will be equally successful in making a score. Very often the angle is too difficult.

Here is where team work comes in. And this point is very important. The rover and center



THE REBOUND SHOT.

have skated to strategic positions before the goal, and the wing off at one side shoots the puck to one of these men. Immediately, both wing men close

in on their team-mate who is receiving the puck. He instantly tries for a goal. Likely as not the puck is blocked by the goal keeper and rebounds outward from him.

In a flash, the stick of one of the wing men is behind the puck again and once more it is traveling toward the net. This follow-up shot follows so fast upon the heels of the first one that the goal keeper may not have had time to regain his balance. In which case, a goal is probably scored. A rebound shot of this sort is one of the hardest in the game for a goal keeper to stop.

The men playing the four offensive positions on a hockey team in addition to being accomplished skaters must be especially adept at carrying and passing the puck. They must be able to carrom it off the side of the rink when pressed by an opposing player, dodge him and then take possession of it once more. They must have the ability to carry the puck down the ice without keeping eyes upon it—both eyes are needed for watching chances and dodging the other man. They need to acquire a certain instinct for knowing the exact instant when the puck should be passed. If a moment too early or too late, the whole play is likely to go to smash. Puck carrying and passing is a science in itself and one which can be learned only with painstaking practice. A good player acquires a marvelous amount of dexterity in playing the puck.

When the members of a certain hockey team have played a clean sportsmanlike game you often hear it said of them: "They played the puck and not the man." This is favorable comment and it means that the team has not indulged in unfair, rough tactics such as deliberately tripping, kicking or charging their opponents. Not infrequently, in the heat of conflict, unintentional fouls are committed and these may be forgiven. But there is an occasional habitual offender who with deliberate purpose seeks to gain advantage by unfair methods. He is far from being an asset to a team and if he doesn't change his ways should be dropped.

The rule governing unnecessary roughness is one of the two most important rules of the game. The other concerns off-side play. A player is off-side when he is in front of the puck, or in other words he cannot receive a pass from one of his own team unless he is even with or behind the passer at the moment when the puck leaves the passer's stick. It sometimes happens that a play has the appearance of being off-side to spectators when in reality it is entirely on-side and within the rules of the game.

Say, for example, that a wing man, thundering down the ice toward the opposing team's goal, meeting interference, passes the puck across the field in a diagonal forward direction. While the

puck is still whizzing across the ice there is a team-mate there to receive and play it. Some spectators may assume that this team-mate was in front of the puck at the moment it was passed and hence that he has made an off-side play in touching the puck. But it would be quite as reasonable to assume that he was behind the puck at the instant of passing and then managed to catch up with it by means of very fast skating.

We now come to the equipment with which the game is played. All hockey players are very fussy about their sticks and the selection of one becomes almost a rite. The matter of selecting the proper hockey stick is a good deal like picking out a tennis racket or golf club. Every man has his own idea of what suits him best.

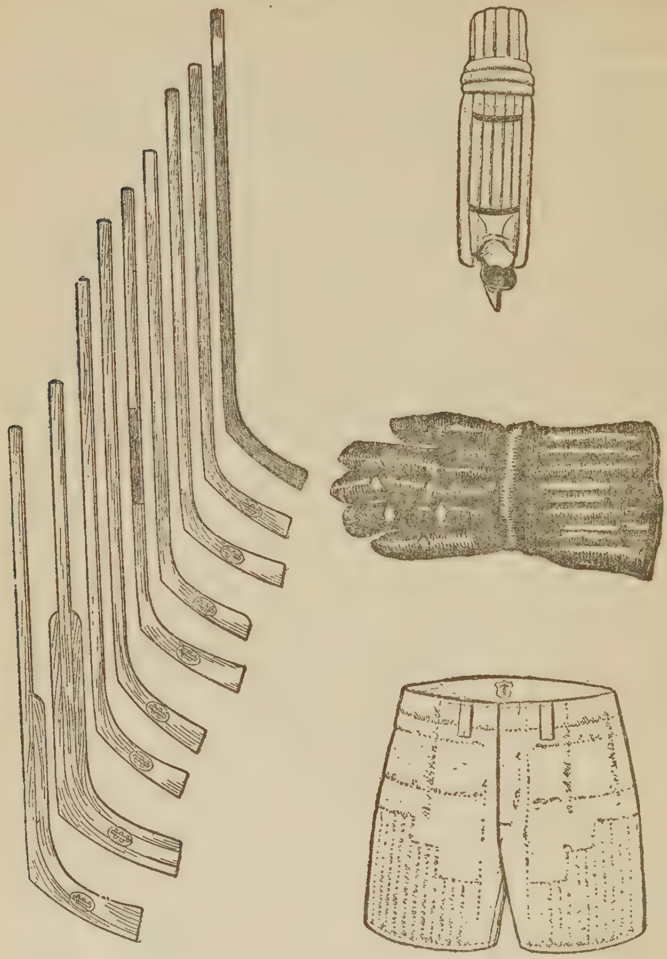
Hockey sticks are made from various kinds of wood but elm and white ash are used mostly and of these two woods, elm is the favorite. In any case, the wood should be straight grained. Some sticks are light in weight and others are fairly heavy. The weights used by professional players range from nineteen to twenty-five ounces.

As with golf clubs, length of shaft and the angle formed by blade and shaft varies with different sticks. The average shaft ranges from forty-six to forty-eight inches in length, while the average blade is about two and one-quarter inches wide and from eleven to twelve inches long. The blade

should not be too flat on the bottom and the shaft should be quite stiff. The shaft, in common with that of a golf club, may have an upright, a medium, or a flat lie. In choosing a club, one's height and individual method of play (for example, the practice either of playing the puck close to or away from one) are important elements.

Another element is the position which one plays upon the team. The respective sticks used by forward players and defense players may vary to some extent but the most marked difference is between the goal keeper's stick and those carried by all remaining members of a team. The goal keeper usually uses a stick having a blade which is three inches wide and thirteen inches long—the rules of hockey do not permit the use of a blade larger than this. Even so, such a blade would be distinctively cumbersome in the hands of any player other than the goal keeper.

Bodily protection is largely a matter of personal choice. The goal keeper is subject to more hard buffets than any other member of the team and therefore he wears more padding. When one receives a flying puck in the leg or body it is rather convenient to have a leg and body guard there to take the sting. Most of the other members of the team are constantly on the go and want as great freedom of action as possible. Some wear only



PLAYING EQUIPMENT FOR HOCKEY, SHOWING THE VARIETY IN STICKS AND THE NECESSARY PADDING OF GOAL GUARDS, GLOVES AND PANTS.

hockey gloves but shin and knee protection is oftentimes advisable.

The subject of hockey skates and shoes has been gone into rather fully in Chapter XV. The combination which practically all expert players now wear is a tubular hockey skate which has been ground down to the proper degree of curvature and is attached to a heelless shoe. Such a shoe, as a rule, is strongly reinforced with webbing, fairly well padded and it has an extremely hard toe cap. The toe cap performs especially valuable service in warding off blows during the heat of play.

So far as ordinary skating is concerned, quite apart from the game of hockey, armored foot protection of the sort which I have just mentioned is both unnecessary and something of a handicap. In this case, a soft toe cap should be substituted for the hard, and a shoe of softer leather all the way through.

CHAPTER XVIII

GETTING ACQUAINTED WITH CURLING

SOME of the snow and ice sports to which we have fallen heritage have come to us from wide and varied sources. The North American Indian has given us the snowshoe, the ski is the gift of the Scandinavian, and from the Scot comes the roarin' game of curling.

Curling has been played in Scotland for five hundred years and in Canada it has been a leading winter sport for the better part of a century. There are enthusiastic curling centers in the United States, especially parts of the Middle West (where you do find curling enthusiasm, there is nothing luke-warm about it) but generally speaking the game has never received in this country the full attention which so skillful a sport deserves.

Liking for curling, in common with many sports, is largely a matter of temperament. There is a fair amount of physical exercise to curling and a considerable amount of excitement for those who appreciate the fine points of the game, but it is neither so active nor so spectacular as most winter sports. Muscle and speed are of no great impor-

tance. Curling, first and last, is a competition of skill. Its merits as a game rest almost wholly on that ground.

Any person who is keen about golf, billiards or bowling is on the way to becoming an enthusiastic advocate of curling, once he begins to realize the subtleties of the game. The curling swing in casting a spinning stone down the smooth field of ice is in some respects not unlike the golfer's swing; there is a distinct "follow through" as in golf. The carroming of stones on the ice and jockeying for advantageous positions is reminiscent of billiards, while the curler's "twist" whereby he gives the desired in-turn or out-turn to the stone may be compared both to the "english" in billiards and the proper placing of the ball in bowling.

Curling belongs to the general category of bowling in that it takes place on a long, narrow, smooth playing field, and down the length of this spins a weighty object delivered from the right hand of one of the players. The playing field, of course, is ice and the weighty object is a granite stone (occasionally iron) weighing about thirty-five pounds. The stone in going forward also has a rotary motion or "curl"; hence the name "curling." In Canada, iron stones weighing about sixty pounds are used.

A curling stone is circular in form and has the general appearance of a tea-kettle with its spout

missing. Attached to the top is a handle which serves as the purchase when delivering a shot. A good curling stone costs more than a complete set of golf clubs, but as there are no clubs to get broken or balls to be lost in curling, it is, in the long run, probably the more economical game of the two.

There are two opposing teams to a curling match with four players to each side. The various players take turns at spinning their stones down the field of ice and these are aimed at a certain mark about forty yards away. It usually happens that part of the playing equipment is a notable Scotch accent, but I would not go so far as to call this essential. Each man, however, is armed with two stones and one ordinary household broom.

The broom plays an important rôle in the game and sweeping becomes a good deal of a science. The broom is used to sweep the ice clear of any minute obstacles which may obstruct the progress of a stone during its trip down the field. When a running stone just cast by one of your teammates shows signs of stopping short of the desired mark, energetic sweeping on your part in front of the lingering stone tends to draw it on and on like a needle attracted to a magnet.

The playing area on the ice is forty-two yards long and about ten yards wide. Before play begins it is necessary to scratch various markings in

the ice with a sharp-pointed instrument of some kind. At one end of the field, three concentric circles are scratched, these having respective radii of seven feet, four feet and two and one-half feet (Canadian rules call for respective radii of six, four and two feet. Either arrangement may be used.)

The common center of these circles is known as the "tee" and this is the most desirable point to find one's stone located after a round of curling has been completed, although this is not necessarily so during the early stages of the round. A stone which comes to rest near the tee early in the round, unless strongly fortified by surrounding stones is likely to be dislodged from its enviable position by the stone of an opponent.

Let us return to the business of marking out the curling rink. It is necessary to have two tees and the second is located at a distance of thirty-eight yards from the first. With this point as a center, three concentric circles of the same radii as before are scratched in the ice. Sometimes a straight line connecting the two tees is scratched, although this is not essential. Various cross-lines, however, at right angles to this either actual or imaginary line are necessary. Also, a line four yards long is made from each respective tee beyond the ends of the rink. The end of each line which is outside the circle is the "foot score."

The cross-lines are known respectively as the "back score," "sweeping score," and "hog score." The distance of the hog score from either tee is one-sixth of the distance between the foot score and the farther tee. The game is played to alternate tees and a curling match consists of a series of rounds known as "heads." The end of a "head" is reached when each of the eight players engaged has taken his turn at delivering his two stones toward a given tee. After sixteen stones have been delivered in this manner toward one end of the field, the winning shots are recorded and a new head is begun by playing to the other tee. Hence the reason for a double set of foot scores, back scores, sweeping scores and hog scores when marking off the playing area.

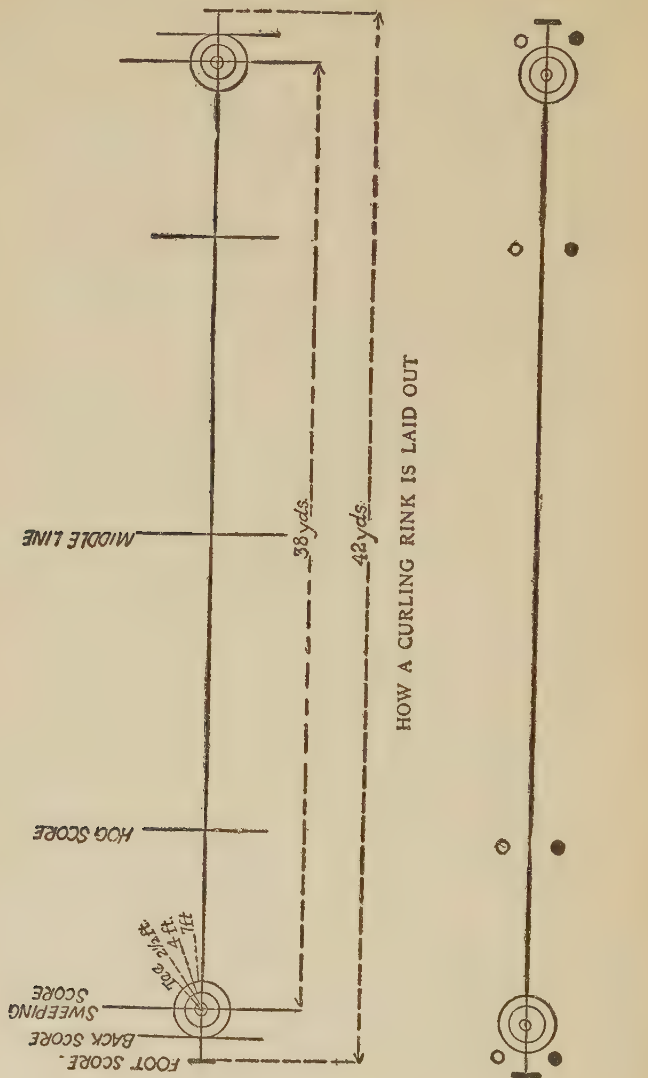
A curling match consisting of thirteen heads takes about two hours in being played off. At the end of each head a record is made of the stones which rest closest to the tee and at the end of the match, victory goes to the side which holds the highest score in this respect. Some matches are played for a specified length of time instead of a certain number of heads.

The method of scoring is simple. We will suppose for example that at the end of a head, a stone belonging to one of your team-mates is closer than all others to the tee. We will suppose furthermore that the next closest is one of your own

stones. But the third closest, we will say belongs to a member of the opposing team, a fact which eliminated any further scoring for your side in that particular head. So, as it stands, your side scores "two." This fact is duly recorded and then another head is begun.

The line-up of the opposing teams at the beginning of a head is indicated in an approximate way by an accompanying diagram. One player has taken his stand upon either a "hack" or "crampit" at the foot score and is about to send his stone down the ice toward the far tee. The opposing player standing beside him will follow and then presently the next two players will move up and take their turns. A "hack" is simply a purchase cut in the ice to hold the foot, while a "crampit" is an iron plate upon which the foot rests. Some players use one and some the other.

The opposing players who are standing at the far end of the ice are the two captains, more generally known as "skips." Except for the time when their own turns come for delivering stones down the ice they remain stationed at these points behind the tee in order that they may constantly watch the actions of the stones. The "skip" is the most important member of a team for it is under his constant direction that a head is "built up," as they say. The strategy and development of the game rests almost solely with him.



HOW A CURLING RINK IS LAID OUT

The area within the seven foot circle of which the tee is the center is known as the "house." When a player standing on the crampit is about to deliver his stone, his skip standing at the far end of the playing field indicates a certain spot in the "house" where he wishes the stone to come to rest. The swing of this player, as I have remarked, is somewhat akin to the swing in golf. His left foot is pointed toward the far tee and about two feet ahead of the right. He lifts the stone, raises the body and then describes with the stone a semicircle and releases the stone easily and smoothly when it is opposite the left foot. As the stone is released from the right hand the left knee is bent and the body and arm are both "following through." Failure to "follow through" may mean a rough bump of the stone as it strikes the ice in place of the required smooth, silent get-away.

If the running stone fails to reach the hog score nearest the "house" or if, on the other hand, it pierces the circle and spins on gayly past the back score it is called "dead" and removed to one side. It oftentimes happens, however, that a lagging stone which shows indication of stopping short of the hog score can, by dint of vigorous sweeping in front be brought safely into the house.

So it is that when a skip senses the fact that a certain stone will not reach the desired mark of its own accord, he orders his team-mates energetically

to sweep. But it is essential that there be just the right amount of sweeping and not too much or the stone may be drawn on past the sweeping score.

When a stone has traveled past the sweeping score, one of the chances which the opposing side has been hoping for comes true. For the opposing skip is now permitted to use his broom in drawing the stone on and he does his best to coax it on beyond the house so that it may be counted "dead." Almost always in a curling match it is desirable to play short instead of beyond the tee, for a stone can be promoted by another stone to a more desirable position but it cannot be brought back, once it has gone beyond.

After several stones of the opposing teams have been delivered down the ice, numerous problems develop which are comparable in some respects to those of a game of chess. To place a stone so that it comes to rest in a desirable position close by the tee is not sufficient; it must immediately be protected by another stone, all avenues of approach must be closed so that it will not be dislodged by the stone of an opponent. This is known as "guarding." One's own position must be constantly strengthened and that of the opposing side hampered.

With stones resting in all sorts of positions around the tee, the game becomes decidedly complicated. Successfully to "build up" a head with

winning shots and keep these well guarded from dislodgement demands keen generalship on the part of the skip and skillful delivery of stones on the part of his team-mates. Important in this skill is the "twist," the real test of proficiency in a player. The twist is accomplished by turning the wrist at the instant when the stone leaves the hand. Sometimes an out-turn is given to the wrist and again an in-turn depending upon whether one wishes the stone to curve to the left or to the right. An expert curler playing the twist can make a stone deviate five feet from a straight line during its run down the ice. The stone travels around blocked avenues and comes to rest in a spot that could not possibly have been reached had a straight shot been used.

One of the difficult and favorite plays in curling is the "inwick." This is accomplished by playing one's stone so that it carroms off the inner side of another stone after somewhat the manner of a billiard shot. Sometimes it happens that an opponent's winning stone resting on or close by the tee is so well guarded by a barricade of stones in front that there seems not the slightest possibility of its being dislodged. Yet by means of a dexterous inwick it is quite possible for you to dislodge the winner and in doing so take the winning position with your own stone.

Another favorite play is the "outwick," which in

some respects is the reverse of the inwick. In this case you carrom off the outer side of the other stone so that your own stone travels off to one side away from the tee, but the stone which is struck travels inward toward the tee. But when the tee is fortified by a barricade of guarding stones the most difficult method of reaching it at all is perhaps by means of the well calculated "draw" shot, which has just the right amount of twist to carry the stone in an arc around the barricade and bring it easily to rest close by the tee.

The three plays just mentioned, together with guarding and the removal of an opponent's guard are among the main points of curling. And enough has been said, I think, to indicate that this five-hundred-year-old game of the Scot is one which demands an exceptional amount of skill. There may be some manner of truth in the belief that a man can learn curling in half an hour but cannot become a perfect curler in a life-time. Which may be one reason why curling in common with golf is a game of such ancient lineage.

CHAPTER XIX

WINTER WEEK-ENDS AT DARTMOUTH

IT was biting cold. The twilight shades of a short-lived Saturday in December were fast thickening into the snow country's semi-darkness. A few moments before, the heavily blanketed, rolling New England hills had been superb pinks and shimmering purples. With the death of the sun the hills had become a ghostly white once more.

Intermittent gusts of a sharp north wind screamed its weird song of woe. As the wail ceased there came to the ears a more calm and gentle tune, one that reminded you of ocean waves softly stealing up upon the dry sands of white beach. It was the gentle and methodical swish, swish, swish, from four pairs of long rangy skis.

In single file, four staunch-legged skiers, head and shoulders bowed in buffeting the piercing gusts of wind, slowly edged their way across an open white meadow and entered the friendly finger of a forest stretched out to meet them. Here was momentary protection from the cutting wind. Heads and shoulders became erect, while a bulging knapsack strapped to the back of each wayfarer slid back to its proper carrying position.

These four intruders of the winter woods were so completely muffled in winter togs that even their own mothers would have failed to recognize them. It happens, however, that six miles behind was Hanover, New Hampshire, and this fact helps in clearing up the mystery.

These men were Dartmouth students, all members of the college outing club. Something more than two hours before, recitations had ended for the week and they were now free men until Monday morning. About one mile ahead, nestled in the protecting shoulder of a wind-swept hill, a cozy cabin was awaiting their arrival. Here was a fireplace to sprawl before and dry out soaked shoes and socks, a kitchen stove to cook the generous supply of food now resting on their pack-laden backs, heavy blankets galore merely to be hauled down from the rafters overhead.

To any person who considers snow and ice in the light of a liability, the Hanover winter would represent utter bankruptcy. In this particular section of New England the winter arrives early and while it lasts the weather is very cold and the snow extremely deep.

Most assuredly here is a winter that can be made either one of two things. On the one hand, it can be made the bane of one's existence; on the other, such invigorating air and lovely surroundings may become a thing of pure joy. Of these two, Dartmouth wisely enough has chosen the pure joy,

Dartmouth residents in no way consider winter a liability. To them winter is a distinct asset.

When a Dartmouth freshman enters college, the first thing he buys are text books. Then, likely enough, he joins the Dartmouth Outing Club and ten minutes later is in a sporting goods outfitter's store picking out a pair of skis, under the careful tutelage of a more experienced upper classman. Of course he has no immediate use for these but somehow a Dartmouth student doesn't feel exactly at home unless he owns a pair. In Hanover, the spirit of winter seems to be present even when its biting sharpness is still months away. Winter sports play about as prominent a part in undergraduate life as do football and baseball.

The main reason for the universal popularity of the invigorating Hanover winter is the Dartmouth Outing Club. The greater part of the student body belongs to this. Also, several members of the faculty.

The club owns a chain of eight cabins extending from Hanover to the portals of the White Mountains. More cabins are being added to this chain and before long they will extend right into the heart of the mountains. Most of these cabins are accessible enough so that a student, upon striking into the hills at the end of Saturday's recitations, can travel to one, two, sometimes three cabins if he wishes, and be back for Monday morning classes.

Some of the cabins are more distant and these trips are usually saved for short vacations or for the expenditure of a precious supply of cuts harbored during the term for this special purpose. Furthermore, the cabins are used to a considerable extent in summer as well as in winter.

Altogether, there are eighty-two and one-half miles of trails connecting the various cabins. The club members themselves have cut and marked these trails and the job has been so thoroughly done that no one by any chance could mistake the route. The trails are clearly marked with arrows and green and white "D. O. C." signs nailed to trees and fences. Some of these trails wander across farmyards now and then, and this with the full consent of the owner. Upon which you notice that the students have shown a rare amount of respect for the other man's property in their trail work. Not a blazed tree is to be found. Where a blaze mark has been necessary, merely a white and green ring has been painted upon the bark of a tree.

This trail work is rare good fun and also exceptionally fine training in woodcraft. Furthermore, there is always some other sort of constructive work to be done around the cabins. In most cases, the club owns the land upon which a cabin stands and can do what it likes with it. In various tracts it has acquired about two hundred and fifty acres in its own right. Not long ago the club decided

that it would like a small lake in front of a certain cabin. A near-by stream had pointed the way to the possibility of this. The engineering school drew plans and presently all hands were busy with shovels. In a short time the lake was a reality.

The Dartmouth Outing Club has come into especial prominence during recent years as the originator and annual sponsor for the Dartmouth Winter Carnival. This carnival is now recognized as one of the national athletic events of the year. It is a winter sports intercollegiate meet in which one or two Canadian and several New England colleges fight for mastery in ski and snowshoe racing and ski jumping. Carnival week is the big week of the winter and from a social standpoint comparable in some respects to Commencement week.

This famous winter sports carnival, however, lasts but a few days. Very little has been said in the world beyond Hanover concerning that part of the club's activities which is perhaps its greatest work, the side upon which I am now attempting to lay special emphasis. This part is especially important because it lasts all winter. It might reasonably enough be called organized "informality," this business of strapping on a pair of skis and going afield in the winter woods merely for the pure joy of the thing itself.

Let us return to the particular four outing club members whom we have left buffeting a piercing

north wind, scarcely a mile from one of the cabins. They have arrived at their destination. The energetic stamping on the veranda floor of four pairs of shoes being cleared of the tenacious snow tells as much. Eight skis have been unbuckled and each of these, its day's work over, is resting on end against the outside wall of the cabin.

A student called "Dave" is digging down through several layers of winter clothing in search of a key. Presently this small metal object gleams in the moonlight, after a certain amount of fumbling with cold hands the cabin door is thrown open, and the four wayfarers pour into an icy interior. A lamp is lighted. This discloses a long, narrow, one-room interior. Along one wall runs a double tier of bunks, each of these bulging with a bulky soft mattress. Hanging from the cross-piece rafters above droop a generous supply of warm blankets. In the centre of the cabin is a fine brick fireplace, and to the rear of this is an open wing which is the kitchen.

The first job on the docket is that of rustling wood for fireplace and stove. Buried beneath a good-sized snow drift just outside the kitchen door is a bountiful wood pile. Unfortunately, this wood is in long lengths, but a two-handed saw soon makes short work of it. Between strokes one of the hard working sawyers is heard to remark critically:

"It's a wonder that bunch of freshmen up here last week couldn't leave a little wood ready sawed."

Presently a body- and soul-warming fire is crackling in both fireplace and stove. Now comes an inventory of food supplies. Packs are emptied and attention is directed toward a tall, freckled-faced sophomore familiarly known as "Red." It seems that earlier in the day Red had been given the responsibility of buying the entire food supply for the crowd. Now the time has come when he is about to be called upon to give an accounting of the manner in which he has handled the trust.

"What did you get for supper, Red?" is the first question.

This brings forth the laconic reply: "Beans and sausage."

"Gee, I came up here to get away from beans."

Red, upon being challenged in this manner, then adds hopefully:

"But I've got steak for to-morrow's dinner."

"What kinda steak?" comes from the critical audience.

"Rump steak."

"*Rump* steak!" in declamatory chorus. "Gosh, Red, but you're a rotten provider."

"They'd give you the same thing if you asked for porterhouse," returns the provident Red.

Dishes are brought forth from the cupboard and the table set. The self-appointed cook, abetted by

two somewhat critical assistants, devotes his attention to the destinies of the hot food sizzling upon the stove.

"How do you know when sausage's done?" inquires the cook in a quandary.

"Just you serve 'em. We'll let you know if they ain't," comes from the expectant table.

Pre-supper criticisms to the contrary, the meal proves to be a huge success. Eventually dishes are washed and then a circle gathers around the crackling fire. The talk which ensues, for the most part, concerns the activities of the Dartmouth Outing Club. A quiet senior breaks an unaccustomed lull in the conversation:

"Say, Dave, want to hike down the whole chain of cabins during Easter holidays? We can take the train to Littleton, spend each night in a different cabin, and get back in Hanover just in time for college opening. How 'bout it?"

Dave thinks this carefully over for a minute or two, then whole-heartedly chimes in:

"Sure thing. I'll go you."

The evening wears on. Plans for the morrow are broached. One venturesome explorer suggests that they leave the cabin early and spend the entire day returning to Hanover by a long détour through the woods. But there remains in the larder a large-sized steak to be devoured, even though it be a rump steak, and this suggestion does

not meet with general approval. The plan finally decided upon is that of taking a morning ski run through the hills, returning to the cabin for a fairly late dinner and then starting out for Hanover toward evening.

A generous supply of wood is stacked up beside the fireplace, two men haul mattresses from the bunks and make their beds in front of the warming fire. The others roll up on the bunks. Outside, the north wind whistles its mournful wail. Inside the cabin, quiet reigns supreme.

The entire incident just related is fairly typical of various small groups of Outing Club members that make an exodus from Hanover to club cabins every Saturday. There comes a time, however, once every year when Dartmouth ambition rises to greater heights than the hills around Hanover. Nothing less than the towering tips of the White Mountains will satisfy this craving. Hence the annual White Mountain trip of the Dartmouth Outing Club.

Between forty and fifty men usually go on this trip. It takes about four days altogether. The college authorities think so well of the work which the club is accomplishing that wisely enough they make the men a present of an extra day or two. A special car is chartered to carry the party by rail to some point in the White Mountains. The men make their headquarters at a hotel in the val-

ley and from there take long day excursions climbing various ranges and peaks. Sometimes Mount Washington is conquered, while again the main objective may be the Franconia Range of the White Mountains.

After accompanying Dartmouth on one of these jaunts one is primed for about anything—either that or a hospital! The job of keeping up with the Dartmouth procession as it steadily winds its way to the top of the world is one that calls for sturdy preliminary training. Here is where the value of the week-end hikes comes in. The man who is not in condition for this big game of winter sports is about as much up against it as the football player who steps into his particular big game of the season without weeks of practice.

To-day, probably every student in Dartmouth and a good share of the townspeople and farmers as well, glide around on skis. Yet this general popularity of the ski dates back but a few years. Practically the first pair of skis ever seen in the streets of Hanover were those worn by Fred Harris of the class of 1911 who startled townsfolk and mildly interested students by appearing in public on sundry occasions swinging silently along on his long rangy snow-boats.

Harris, together with one or two cronies, had made the discovery that if you keep going on a pair of skis or snowshoes, you can keep just about

as warm as by staying in a stuffy room listening to the whistle of a steam radiator, even when the thermometer is thirty below zero. Furthermore, it was found that the whistle of a winter wind piercing the pines is much more inspiring than that of the radiator.

Harris and his friends took to skiing and snowshoeing through the hills on Saturdays and Sundays. These short trips were merely for the pure joy of covering miles of crystalline whiteness; there was no particular objective. One of these trips, however, happened to take them through the woods of Moose Mountain, about eight miles from Hanover. Here they stumbled upon a deserted shanty. In that stumble were the beginnings of the Dartmouth Outing Club.

To Harris this shanty offered possibilities as a week-end bungalow. Upon investigation it developed that the property belonged to Dr. Giles of the college faculty. Dr. Giles told Harris that he and his friends could use the shack. In due time the entirely natural and essentially American thing was done. A club was organized. This was called the Dartmouth Outing Club. And from this small handful of friends, the membership has grown to nearly a thousand.

The original shanty under the lee of Moose Mountain is still there, but it is now used only for overflow meetings. Beside it is a much grander

cabin, a roomy, well-shingled bungalow put up by carpenters who knew their job. This is one of the eight cabins of the club chain.

It happens that the club did not get going in a big way until Dr. J. E. Johnson, a Dartmouth alumnus of the class of '66, appeared upon the scene. Dr. Johnson got wind of what was going on and saw clearly enough that the young Outing Club was one worthy of support.

The kind of support most needed for expansion was money. Dr. Johnson gave a supply of this.

Of course with financial support there has to go enthusiasm from within the ranks. The Dartmouth Outing Club knows no end of this requirement, not only on the part of the students but from the faculty as well. The faculty take up the club activities with the same sort of enthusiasm that the students themselves do. In fact it is often difficult to tell the difference between teacher and student. There is a camaraderie of the outdoors between the two that knows no class-room lines.

The Dartmouth Outing Club, if it were the only organization of its kind in existence in this country, would be of no special significance. The reason why I have given the history of this club in such detail is because it is very significant of the changed attitude toward winter which is abroad throughout the snow and ice zone. My friend Albert Britt aptly terms this the "discovery" of winter. Num-

erous and varied expressions of the winter spirit (of which the Dartmouth Outing Club is but a single instance) serve as fairly conclusive proof that winter is neither deadly nor is it prison to soaring spirits.

Very nearly half the United States and practically all of Canada are in the snow and ice zone. Every here and there within this vast stretch of territory small groups have cleared the road, refused to consider winter a liability and answered the lure of ski and skate and snowshoe. The new spirit of winter has gone ahead with leaps and bounds. Entire communities now hold winter carnivals, the winter vacationist who goes north instead of south is another development (to Lake Placid, for example), numerous college winter clubs have been modeled after the Dartmouth club.

These are a few expressions of the winter spirit which indicate quite clearly the healthful and invigorating appeal of the winter outdoors. For if you are overlooking the fun of snow and ice you are missing one of the best things in life. And so it is that I close, wishing you a long, cold winter and a merry one.